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ENVIRONMENTAL RESEARCH PROGRAM 1987-1988

INVENTORY OF RESEARCH AND DEVELOPMENT PROJECTS

NOVEMBER, 1987

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Environment

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ENVIRONMENTAL RESEARCH PROGRAM

1987 - 1988

INVENTORY OF RESEARCH AND DEVELOPMENT PROJECTS

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PREFACE

The Inventory of Research Projects is coordinated by the Research Management Office, Policy and Planning Branch, Ministry of the Environment, and is a component of the 'Research Management Process' (1987). The report is a compilation of project summaries for research currently being funded by the Ministry, including both extramural projects carried out by universities, consultants, and other external research institutions and agencies, and research carried out within the Ministry.

ACKNOWLEDGEMENT

The preparation of this inventory was coordinated with assistance from many key contributors. The Project Liaison Officers, who prepared many of the inventory forms, played an essential role in project management and evaluation, and in providing effective liaison between the Ministry of the Environment and the project investigators. Appreciation is also extended to Nora Paradis and Anne Robertson who initiated the compilation of the inventory, and to Maura Dales who completed the editing and revision of the final version. The research investigators are gratefully acknowledged for their valuable contributions and their participation in research contributing to a better Environment in Ontario.

DISCLAIMER

Since research is a dynamic process, and it has taken several months to compile, edit and revise the inventory, some of the information on individual projects or budgets listed in this document may not be entirely up to date.

The views and ideas expressed in the project outlines are those of the authors and do not necessarily reflect the views and policies of the Ministry of the Environment, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

**SCIENTIFIC RESEARCH AND DEVELOPMENT
INVENTORY OF PROJECTS
1987 - 1988**

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INTRODUCTION

This inventory represents a compilation of descriptions of all research projects funded by the Ministry of the Environment (MOE) in 1987-1988. The purpose of the inventory is to foster better coordination of Environmental research in Ontario, to ensure the dissemination of research findings, and to document the commitment of the Ministry to effectively allocate resources to environmental research consistent with MOE policies and priorities.

The inventory presents profiles of individual research projects being conducted by or for Ministry Branches and Regions in 1987-1988. It includes in-house research activities as well as research generated through grants and contracts to universities, consultants and other external research institutions and agencies. Projects are classified into the following categories according to the sponsoring Committee or Branch.

- Research Advisory Committee
- Air Resources Branch
- Water Resources Branch
- Laboratory Services Branch
- Ontario Pesticides Advisory Committee

It is hoped that publication of the inventory will help further the technology transfer of environmental research funded by the Ministry of the Environment and will assist in the early dissemination of study findings.

FORMAT OF THE INVENTORY

Each project is classified as i) External or Internal, ii) Contract or Grant, and iii) Solicited or Unsolicited and the project summary includes the following headings:

<u>Project Title and Project number</u>	For identification purposes
<u>Start Date</u>	Date that the project was initiated
<u>Short Title</u>	For administration purposes
<u>Principal Investigator</u>	Contact person for additional information on the project
<u>Liaison Officer or Supervisor</u>	The Ministry of the Environment staff member responsible for the management of the project
<u>Objective(s)</u>	The purpose(s) behind undertaking the project
<u>Project Description</u>	A summary of the project and methodology employed.
<u>Budget and Resources</u>	A table of the estimated staff resources and expenditures determined at the time of approval. This budget is allocated on a project year basis (*indicates the current year) and the Man Years necessary for each year are also indicated.
<u>Budget Source</u>	The funding source for the project (RAC, Research Advisory Committee; ARB, Air Resources Branch; WRB, Water Resources Branch; LSB, Laboratory Services Branch; OPAC, Ontario Pesticides Advisory Committee.)
<u>Output</u>	Completed papers, presentations and reports relevant to the project.
<u>External Participation</u>	Other agencies funding or participating in the project.
<u>Comments</u>	Specific remarks on the project not covered under the previous headings.

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EXTERNAL X Contract X Solicited X
INTERNAL Grant Unsolicited

Date : May 28, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Trace Organic Contaminant Removal
From Drinking Water

PROJECT NO: 099C
START DATE: (m/yr): Mid-85
RES. PRIORITY:

SHORT TITLE: Drinking Water

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Mr. John Hilton
and Affiliation: MacLaren Plansearch

LIAISON OFFICER: K. Roberts - Water Resources Branch
(name, location, phone no.) 323-4881

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To assess the effectiveness of both optimized conventional drinking water treatment and activated carbon adsorption (add-on contactor mode) for the removal of trace organic contaminants.
2. To determine process operational parameters for both systems.

PROJECT DESCRIPTION: The project is designed to investigate the removal of trace organics from drinking water by conventional treatment and fixed bed granular activated carbon (GAC) treatment.

Since the project was begun in mid-1985, a number of activities have been ongoing leading to the Phase I report. These are:

1. Selection of target compounds for both the conventional and GAC evaluation phases of the study.
 2. Development of analytical methodology to measure target compounds to the low parts per trillion (PPT) level.
 3. Development of the detailed experimental plan to monitor performance and minimize analytical requirements.
 4. Design of the database management system and statistical data evaluation methodology.

Work has begun on Phase II which involves:

1. Bench scale testing to optimize coagulant and coagulant aid dosages to achieve maximum organics removal.
 2. Pilot equipment set-up and characterization testing of the target compound dosing system and the possibility of adsorption of these compounds on the pilot plant equipment.

BUDGET AND RESOURCES: Year: (* current) 2 3 * 4 TOTAL

EXTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source: RAC	Man Years :

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: Progress / Status under review

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRR, NER etc.)

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : May 28, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Mutagenicity Testing of Leachates From Waste Disposal Sites PROJECT NO: 103C
START DATE: (m/yr): 09/84
RES. PRIORITY:

SHORT TITLE: Leachates MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator G.H. Thomas, D.K. Smith and A.J. Horton
and Affiliation: Ontario Research Foundation

LIAISON OFFICER: D. Rokosh - Water Resources Branch, Resources Road
(name, location, phone no.) 235-5787

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop methods based on the Ames Salmonella Mutagenicity Assay to detect potentially harmful contamination of groundwater supplies by genotoxic substances leached from landfill sites.

PROJECT DESCRIPTION: A selection of chemical compounds (suspected/known mutagens) exhibiting different functional group features and representing a wide range of polarity in order to develop and validate methods for the collection of organic extract concentrates from both groundwater and site matrix materials. The extracts must be suitable for use in the Ames bioassay. The collection method must be capable of providing sufficient amounts of extract for both initial screening in the Ames assay and any follow-up testing in other bioassay systems. The demonstration of the application of the methodology for the collection of organic concentrates of groundwater and site matrix materials from a representative area within a selected landfill site. The various extracts will be evaluated for mutagenic activity. By comparison of the mutagenicity found in the matrix extracts, it may be possible to develop an index of leachability for mutagenic material that can be related to the mutagenicity found in the associated groundwater.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
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EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	83.0	91.6	25.0	199.6
	Salaries :	67.0	33.4		100.4
Budget	Total :	150.0	125.0	25.0	300.0
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract X
INTERNAL Grant

Solicited
Unsolicited

Date : May 28, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Evaluation of Data of Project 28PL:
'Effects of Hydraulic Characteristics and Effluent
Chlorination on the Incidence of Micro-Organisms of
Public Health Significance in Receiving Waters'

PROJECT NO: 105C
START DATE: (m/yr): 02/85
RES. PRIORITY:

SHORT TITLE: Data Evaluation for 28PL

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. M. Palmer
and Affiliation: Gore & Storrie Limited

LIAISON OFFICER: T. Ho - Water Resources Branch
(name, location, phone no.) 323-4980

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S):-To develop a critique of the statistical methodology used by Beak (project 28) and to devise a new approach if the former is inappropriate.
-to integrate all the data in the appropriate model.
-to conduct statistical analysis of data to fulfill the objectives of the Beak study (project 28PL).
-Further details are presented in the Request for Proposal.

PROJECT DESCRIPTION: The generated data should fulfill the objectives of the original study, and should be of a nature to develop guidelines and criteria for efficient disinfection in Ontario.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	12.8			12.8
	Salaries :	14.1			14.1
Budget	Total :	26.9			26.9
Source: RAC	Man Years :				
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 28, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Integrated Pest Management on Field Corn: A Feasibility Study

PROJECT NO: 138G
START DATE: (m/yr): 05/84
RES. PRIORITY:

SHORT TITLE: I.P.M.

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator and Affiliation: Wayne Roberts, Program Manager, Pest Management OMAF, Guelph Agriculture Centre

LIAISON OFFICER: J. Lucas - Hazardous Contaminant Coordination Branch
(name, location, phone no.) 323-5111

INTERNAL PROJECTS

INTERNAL PROJECTS
Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To define the scope of the problem through a survey of the pest complex (insects and weeds) in field corn;
2. To evaluate available monitoring techniques with emphasis on combining various methods in a total program suitable for Integrated Pest Management;
3. To demonstrate the capability of making cost-effective Integrated Pest Management decisions for field corn.

PROJECT DESCRIPTION: Approximately 1/2 of the 0.8M hectares of field corn grown annually in Ontario are treated with insecticides for rootworm control. Previous studies have shown that this extent of pesticide usage is unwarranted, but a suitable data base for evolving an Integrated Pest Management approach is unavailable. The present study would therefore monitor some 20 field sites for both weeds and insects. Monitoring techniques presently recommend for each pest would be evaluated. Research inputs from Agriculture Canada and the University of Guelph, combined with the survey data, would then be used to evaluate the effectiveness and reliability of an IPM program for field corn.

**BUDGET AND
RESOURCES:** Year: (* current) 3 4 * 5 **TOTAL**

EXTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total : 80.8	74.7	81.7		378.1
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total : Man Years :
Source:	

OUTPUT (papers, presentations, reports): Annual Reports: 1985. 1986. 1987.

EXTERNAL PARTICIPATION (ministries, governments, agencies):
OMAF and University of Guelph

COMMENTS.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRR, NFR etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 25, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Experimentally determined Mutation
Rates in Lung and Bronchial Epithelia as a Primary
Air Pollution Standard

PROJECT NO: 142G
START DATE: (m/yr): 01/85
RES. PRIORITY:

SHORT TITLE: Mutation Rates

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator John A. Heddle, Department of Biology
and Affiliation: York University

LIAISON OFFICER: M. Salamone - Water Resources Branch, Resources Road
(name, location, phone no.) 235-5790

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): Development of a mutagenic test for atmospheric contaminants using cells
derived from the lining of the lung and the bronchus.

PROJECT DESCRIPTION: - Phase I of the study was satisfactorily completed

- A paper was presented at the Technology Transfer Conference No. 6
- An interim payment of \$30,000 was approved to provide continuity of the research
- Approval of the balance of \$78,909 was granted to carry out Phase II of the study.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	25.1	40.8		65.9
	Salaries :	64.0	68.1		132.1
Budget	Total :	89.1	108.9		198.0
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies): None

COMMENTS: Requested third year funding; proposal # 837

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL	X	Contract	Solicited
INTERNAL		Grant	X
			Unsolicited X

Date : June 29, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: To Determine Dose-Response Relationships for Food Crops due to the Effects of Airborne Gaseous and Particulate Pollutants

PROJECT NO: 144G
START DATE: (m/yr): 07/84
RES. PRIORITY:

SHORT TITLE: Dose Response

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator and Affiliation: D.P. Ormrod, Department of Horticultural Science
University of Guelph

LIAISON OFFICER: D. Harper - Air Resources Branch
(name, location, phone no.) 456-2504

INTERNAL PROJECTS

INTERNAL PROJECTS
Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To determine response of tomatoes, potatoes, cabbages, carrot, soybean, corn and wheat to ozone.
2. Dose-response relationships for visible injury and growth rates under long-term exposure at ambient levels in polluted regions.
3. To provide objective data on relationships between pollutant concentrations and plant growth and yield, and to indicate the acceptable levels to protect food crops from damage.

PROJECT DESCRIPTION: Controlled ozone exposure experiments are to be conducted at the University of Guelph using tomatoes, potatoes and cabbages. Visible injury, growth and effects will be evaluated. Statistical and experimental procedures leading to the development of response curves and surfaces will be used to graphically portray plant responses. Dose-response relationships will be expressed. Direct comparisons will be made with monitored levels of pollutants in contaminated regions and emphasis will be placed on the utilization of 7-hours per day regimes in ozone studies.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	5.0	5.0	5.0	15.0
	Salaries :	24.9	24.9	24.9	74.7
Budget	Total :	29.9	29.9	29.9	89.7
Source: RAC	Man Years :	1.6	1.6	1.6	4.8
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports): Three Technology Transfer Conference presentations (1 per year) and a refereed publication.

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRP, NRP etc.).

EXTERNAL X Contract Solicited Date : June 29, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The Distribution, Origins and PROJECT NO: 145G
Behaviour of Local Shallow Groundwaters Containing START DATE: (m/yr): 10/84
Elevated Concentrations of Chlorides RES. PRIORITY:

SHORT TITLE: Chloride in Water MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Professor K.W.F. Howard, Division of Physical Sciences
and Affiliation: University of Toronto, Scarborough Campus

LIAISON OFFICER: P. McKenna - Water Resources Branch
(name, location, phone no.) 323-4892

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To determine natural background levels of groundwater contaminants and identify their sources.
2. To determine chemical behaviour of groundwater contaminants, their migration and accumulation rates and to evaluate regional magnitude of the problem.

PROJECT DESCRIPTION: 1. Literature and land use data will be reviewed, and sampling and analyses of groundwater for background data and site selection will be developed.

2. Contaminated groundwater will be analyzed to identify contaminant migration and accumulation.

Completion of this project will provide MOE with a protocol to identify point and non-point contamination sources and with the capability to predict long-term hazard from non-point sources of contamination.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	8.2	11.8	10.2	30.2
	Salaries :	16.8	16.8	16.8	50.4
Budget	Total :	25.0	28.6	27.0	80.6
Source: RAC	Man Years :	1.8	1.8	1.8	5.4

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Papers presented at Tech. Trans. Confs., 1985 and 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 26, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Geomechanical Investigation of the
Origin and Properties of Near Surface Fractures
in Clayey Tills

PROJECT NO: 147G
START DATE: (m/yr): 01/85
RES. PRIORITY:

SHORT TITLE: Clayey Tills

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Maurice B. Dusseault, Geological Engineering
and Affiliation: University of Waterloo

LIAISON OFFICER: A. Scott - Waste Management Branch
(name, location, phone no.) 323-5218

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To determine the distribution and properties of fractures in clayey glacial deposits.
2. To define possible processes by which fractures in clayey deposits were created.
3. To assess the geomechanical effects of clayey till fractures on the flow of leachate through the weathered zone.

PROJECT DESCRIPTION: It is proposed to investigate the geomechanical behaviour of fractured clayey till in an attempt to probe the origin of these fractured zone. The potential of these fracture networks to allow contaminant migration is of concern to environmental agencies. Studies dealing with the changes in hydrogeologic characteristics under various stress and hydraulic pressure conditions are essential to better evaluate the suitability of these deposits for waste disposal.

BUDGET AND Year: (* current) 1 2 * 3 TOTAL
RESOURCES:

EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	15.7	3.8		19.5
	Salaries :	9.9			9.9
Budget	Total :	25.6	3.8		29.4
Source: RAC	Man Years :				2.0

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL	X	Contract	Solicited
INTERNAL		Grant	X
			Unsolicited X

Date : May 25, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The Fate of Hazardous Organic Compounds in Municipal Water Pollution Control Plants

PROJECT NO: 149G
START DATE: (m/yr): 07/84
RES. PRIORITY:

SHORT TITLE: Organic Compounds

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Glynn Henry and Donald Mackay
and Affiliation: University of Toronto

LIAISON OFFICER: T. Ho, Water Resources Branch
(name, location, phone no.) 323-4980

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop a model and protocol for the prediction of fate of hazardous organic compounds in municipal water pollution control plants.

PROJECT DESCRIPTION: Literature will be reviewed, analytical methods developed for a selection of hazardous chemicals, and a laboratory model simulating a municipal wastewater treatment system will be constructed. The latter will be tested and used to study the fate of hazardous contaminants in control and actual wastewater samples. The refined model will be applied to data obtained from a full-scale plant.

The present study complements several related studies now in progress such as: hazardous contaminants in WPCP in Hamilton, development of a routine protocol for wastewater analyses, etc.

BUDGET AND RESOURCES:		Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)					
	Operating:	6.0	6.3	6.7		19.0
	Salaries :	13.0	13.7	14.3		41.0
Budget	Total :	19.0	20.0	21.0		60.0
Source:RAC	Man Years :	1.1	1.1	1.1		3.3
INTERNAL PROJECTS	Cost: (000's)					
	Operating:					
	Salaries :					
Budget	Total :					
Source:	Man Years :					

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf.. 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited Date : May 25, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development of predictive organic contaminant structure-property-toxic relationships for aquatic Organisms PROJECT NO: 150G
START DATE: (m/yr): 07/84
RES. PRIORITY:

SHORT TITLE: Aquatic Organisms

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator and Affiliation: Dr. D. Mackay, Department of Chemical Engineering
University of Toronto

LIAISON OFFICER: John Ralston - Water Resources Branch
(name, location, phone no.) 323-4924

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop methods to correlate organic contaminant structure to its physical properties, organism uptake rates and toxic effects.

PROJECT DESCRIPTION: The physical properties of a wide selection of organic compounds (30-50) will be correlated to their molecular structure and toxicity levels. The latter will be extended to include bioassays. The findings will be extended to link with MOE toxicity data on both individual and mixtures of hazardous chemicals.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	6.0	6.0	6.0	18.0
	Salaries :	13.0	13.0	13.0	39.0
Budget	Total :	19.0	19.0	19.0	57.0
Source: RAC	Man Years :	1.1	1.1	1.1	3.3
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf.. 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The Effects of Tile Drainage and Open Ditches on Peak Flows and Dry Weather Flows

PROJECT NO: 152G
START DATE: (m/yr): 11/84
RES. PRIORITY:

SHORT TITLE: Peak Flows

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator **W. Edgar Watt, Professor of Civil Engineering**
and Affiliation: **Queen's University**

LIAISON OFFICER: Lloyd Logan - Water Resources Branch
(name, location, phone no.) 323-4984

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To assess the effects of tile drainage and open ditches and dry weather flows with particular application to Ontario.

PROJECT DESCRIPTION: A simulation model for tile-drained agricultural fields and basins will be developed and evaluated. The developed technique will be used to study tile drained fields in the South Nation River.

The study will provide an improved tile drain design that reduces erosion and produces information necessary for the development of drainage guidelines.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	3.0	3.6	5.0	11.6
	Salaries :	19.0	20.0	20.0	59.0
Budget	Total :	22.0	23.6	25.0	70.6
Source: RAC	Man Years :	1.5	1.4	0.9	3.8

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports): Paper presented at Tech. Trans. Conf., 1985,
Poster presented at Tech. Trans. Conf.. 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 26, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Laboratory and Numerical Model
Studies to Design Criteria for Optimal Recovery
of Leachate under Sanitary Landfills

PROJECT NO: 153G
START DATE: (m/yr): 09/84
RES. PRIORITY:

SHORT TITLE: Leachate Recovery

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator R.N. Farvolden, R.W. Gillham, and E.O. Frind
and Affiliation: University of Waterloo

LIAISON OFFICER: M. Goodwin - Waste Management Branch
(name, location, phone no.) 323-5217

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): -Evaluation of tile drain systems as a method for leachate capture and development of criteria for their design.
-Development of criteria for overall design of landfills to enhance leachate capture

PROJECT DESCRIPTION: To modify a scaled physical model landfill to simulate the effects of tile configuration on leachate capture and migration for different settings including clay liners under varying simple but realistic hydrogeologic and climatic conditions.

To test a numerical model for conditions tested physically and extend model to account for anisotropy and simple layered media and use the model to evaluate and predict effectiveness of leachate capture for various tile configurations and hydrogeologic settings.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	8.5	8.8	11.9	29.2
	Salaries :	22.2	28.1	27.6	77.9
Budget	Total :	30.7	36.9	39.5	107.1
Source: RAC	Man Years :	0.3	0.3	0.3	0.9

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Confs., 1985 and 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited Date : May 25, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development of a Methodology for
use of Freshwater Clams as a Biological Response
System to Monitor the Nearshore Environment of
the Lower Great Lakes

PROJECT NO: 162G
START DATE: (m/yr): 08/84
RES. PRIORITY:

SHORT TITLE: Freshwater Clams **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator Dr. Roger H. Green, Department of Zoology
and Affiliation: University of Western Ontario

LIAISON OFFICER: P.B. Kauss - Water Resources Branch
(name, location, phone no.) 323-4952

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To select biological response variables related to molluscs in Lake Erie.
2. To identify analytical methods and contaminants, and evaluate the use of bivalve
mollusc shells to generate time-profile environmental impact data.
3. To develop statistical models which predict biological response from environmental
quality.
4. To assess the generality of the developed models at several locations and assess
genetic components of the biological response.

PROJECT DESCRIPTION: Conduct field studies in the Long Point Bay area to establish the dominant mollusc species and environmental and biological gradients. Genetic and morphological variability will be determined for various mollusc species from this area and some contaminated sites. Analytical methods for shell constituents will be evaluated. Predictive models which relate responses of bivalve molluscs to environmental gradients and quality will be developed and tested. The study will provide the Ministry with an inexpensive, long-term method for assessing the quality of Great Lakes nearshore environment using molluscs for bio-monitoring.

BUDGET AND RESOURCES:		Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)					
	Operating:	26.4	8.0	6.2	40.6	
	Salaries :	5.0	16.4	11.4	32.8	
Budget	Total :	31.4	24.4	17.6	73.4	
Source:RAC	Man Years :	0.4	1.5	1.1	3.0	
INTERNAL PROJECTS	Cost: (000's)					
	Operating:					
	Salaries :					
Budget	Total :					
Source:	Man Years :					

OUTPUT (papers, presentations, reports): Presented- 1986 Technology Transfer Conference.
Several other publications are available on request from the investigator.

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The Quantitative Assessment of
Toxicity of Ingested and Inhaled Halogenated
Aromatic Hydrocarbons (Dioxins etc.) PROJECT NO: 165G
START DATE: (m/yr): 09/84
RES. PRIORITY:

SHORT TITLE: Aromatic Hydrocarbons **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator and Affiliation: Drs David Clark and George Sweeney, Dept. of Medicine McMaster University

LIAISON OFFICER: Dr. B. Birmingham - Hazardous Contaminants Coordination
(name, location, phone no.) Branch 323-5105

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1) To obtain information on suppression of the immune response by halogenated aromatic hydrocarbons, including TCDD, PCBs and PBBs;
2) To develop sensitive, non-invasive techniques for biological monitoring of toxic effects of aromatic hydrocarbons;
3) To clarify the effect of age and route of exposure on "no demonstrable effect" dose level.

PROJECT DESCRIPTION: The work is concerned with immunosuppression and due to the stage of knowledge in this area, it is largely limited to studies on inbred strains of mice and observations on human subjects. Further, the nature of current immunological techniques is that the gap between development of approaches for immune surveillance in the mouse is likely to become applicable to humans. It is proposed to study immunosuppression in inbred strains of mice by purified haloaromatic hydrocarbons such as TCDD and environmentally derived samples through collaborative links. The goal is to develop assays which will have application to human populations.

BUDGET AND RESOURCES:		Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)					
	Operating:	15.9	15.6			31.5
	Salaries :	49.1	58.5			107.6
Budget	Total :	65.0	74.1			139.1
Source:RAC	Man Years :	2.2	2.3			4.5
INTERNAL PROJECTS	Cost: (000's)					
	Operating:					
	Salaries :					
Budget	Total :					
Source:	Man Years :					

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf.. 1985

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRR, NFR etc.)

EXTERNAL X Contract
INTERNAL Grant X

Solicited
Unsolicited X

Date : May 26, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Syntheses of Oxygen and Sulphur PAHs
of Interest in Environmental Pollution and
Toxicology

PROJECT NO: 170G
START DATE: (m/yr): 08/84
RES. PRIORITY:

SHORT TITLE: Environmental Pollution

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator E. Lee-Ruff, Department of Chemistry
and Affiliation: York University

LIAISON OFFICER: O. Meresz - Laboratory Services Branch
(name, location, phone no.) 235-5762

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To prepare polynuclear aromatic hydrocarbon compounds for use as chemical standards in the analysis of air particulate matter.

PROJECT DESCRIPTION: A method will be developed for the preparation of PAH, furans and related hazardous compounds. The method will be extended to the preparation of thiophenes and other chemicals suspected in emission sources from coal, municipal incineration and diesel engines.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	7.0	3.5	4.0	14.5
	Salaries :	6.0	6.5	6.5	19.0
Budget	Total :	13.0	10.0	10.5	33.5
Source: RAC	Man Years :	1.1	1.1	1.1	3.3

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Confs., 1985 and 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : May 28, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Application of Taga 6000 Method in
the Measurement of Dioxin and Furan Emissions at
Municipal Solid Waste Incinerators

PROJECT NO: 177C
START DATE: (m/yr): 01/85
RES. PRIORITY:

SHORT TITLE: Taga Dioxins MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. B. Sushan
and Affiliation: SCIEX (Division of MDS Health Group Ltd.)

LIAISON OFFICER: V. Ozvacic - Air Resources Branch
(name, location, phone no.) 965-5770

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To assess cost effectiveness and practicality of a methodology to rapidly determine dioxins and furans at municipal solid waste incinerators.

PROJECT DESCRIPTION: Apply and validate an alternative method for analyzing PCDD and PCDF in fly ash and air emission samples and compare with conventional methods.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget Source: RAC	Total : Man Years :	129.5	11.5		141.0
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget Source:	Total : Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Confs., 1985 and 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : May 28, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Applying New Technology For
Defluoridation of Water Supply Systems

PROJECT NO: 180C
START DATE: (m/yr): 03/85
RES. PRIORITY:

SHORT TITLE: Defluoridation

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator P.J. Halliday, Senior Process Chemist
and Affiliation: Proctor & Redfern Group

LIAISON OFFICER: J. Dart - Water Resources Branch
(name, location, phone no.) 323-4876

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): Review the literature and evaluate, on a pilot plant scale, the use of activated alumina for the removal of fluoride under various temperature, flow and regeneration conditions including reverse osmosis.

PROJECT DESCRIPTION: The study will 1) take American defluoridation of potable water supply data and extrapolate it on Canadian conditions of treatment and waste disposal; 2) carry out a literature review and limited on-site pilot tests on elevated-fluoride well water; 3) compare two treatment choices - an activated alumina bed and a reverse osmosis unit - in two-week long pilot tests; 4) Estimate design requirements and projected treatment costs from the trials to show the equivalent economics for the two options.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	5.0	13.0		18.0
	Salaries :				
Budget	Total :	5.0	13.0		18.0
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1985

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 25, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Grit Removal at Sewage Treatment
Plants Using a Low Pressure Hydrocyclone

PROJECT NO: 184G
START DATE: (m/yr): 06/85
RES. PRIORITY:

SHORT TITLE: Grit Removal

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. J.D. Broadway, Department of Civil Engineering
and Affiliation: Queen's University

LIAISON OFFICER: H. Kronis - Water Resources Branch
(name, location, phone no.) 323-4986

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop a low pressure and efficient hydrocyclone suitable for grit removal from raw sewage.

PROJECT DESCRIPTION: Hydrocyclones have long been used for grit removal in pulp and paper industry. The use of this technology for grit removal from sewage has been limited mainly due to the high pressure differentials used and the resulting energy cost.

In this project a low pressure laboratory-scale system will be developed and evaluated for grit removal from sewage. The resulting hydrocyclone design may then be used at sewage treatment plants.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	10.0	10.5		20.5
	Salaries :	6.5			6.5
Budget	Total :	16.5	10.5		27.0
Source: RAC	Man Years :				0.6

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 25, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: In-Situ Assessment of Mixed Copper and Zinc Impacts on White Sucker (*Catastomus commersoni*) Populations in Several Northern Ontario Lakes: an Evaluation of the Environmental Health Assessment to Validating Water Quality Criteria

PROJECT NO: 193G & 331G
START DATE: (m/yr): 04/85
RES. PRIORITY:

SHORT TITLE: Copper & Zinc

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator George Dixon
and Affiliation: University of Waterloo

LIAISON OFFICER: C. Neville - Water Resources Branch
(name, location, phone no.) 235-5799

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): This study represents an integrated field - laboratory program designed to determine the impacts of metal contamination on the white sucker populations of several lakes in the Manitouwadge district of Ontario. Metal effects will be assessed in terms of reproductive capacity, and survival of larval fish. The program will fulfill the stated research needs of the Ministry: 1) the development of in-situ and ecosystem indicators of water quality impairment, 2) validation of a water quality criteria - objective approach to limiting the detrimental effects of aquatic contaminants, 3) to determine the impacts on Manitouwadge lakes and 4) to fully evaluate difference in growth, larval survival and larval resistance to metals as well as provide information on additional lakes.

PROJECT DESCRIPTION: This study will follow seasonal changes in gonad development, serum steroid levels and gamete viability in white suckers sampled from lakes in the Manitouwadge chain representing low, moderate and elevated levels of copper and zinc contamination. The fish will also be examined for histopathological evidence of a reaction to the elevated metal levels. During the second phase of the project, fertilized gametes from representative lakes will be returned to the University of Waterloo and examined for abnormalities in development and/or growth. Simultaneous toxicity tests will determine the possibility of genetic input to altered relative metal tolerance.

In order to validate assessment models it is necessary to isolate and identify factors associated with the altered health of the white sucker populations. More information is required on the nutritional and energy status of the fish, maternal factors associated with increased metal tolerance and effects of cross-fertilization between lakes. This additional information will provide the strongest database for future comparisons of additional studies on ecosystem health in degraded environments.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
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EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	22.8	15.9	15.3	54.0
	Salaries :	16.0	16.0	22.9	54.9
Budget	Total :	38.8	31.9	38.2	108.9
Source: RAC	Man Years :	1.5	1.5	1.8	4.8

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports): Annual and semi-annual reports.
Paper presented at Tech. Trans. Conf., 1986. Four papers prepared for publishing.

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: Approved for third year

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 25, 1986
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Multi-media Environmental and Human Exposure Assessment of Organic Contaminants PROJECT NO: 194G
START DATE: (m/yr): 04/85
RES. PRIORITY:

SHORT TITLE: Organic Contaminants MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator D. Mackay, Department of Chemical Engineering & Applied and Affiliation: Chemistry, University of Toronto

LIAISON OFFICER: Jim Smith - Hazardous Contaminants Coordination Branch
(name, location, phone no.) 323-5113

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To develop the capability of predicting spatial variations of chemical concentrations of selected hazardous substances in the environment from known mean values; 2. To validate the statistical distributions with extensive monitoring data obtained for Southern Ontario; 3. Link these environmental concentrations with an exposure assessment model to determine total amounts available to human through air inhalation, diet and drinking water as an aid to identify the dominant exposure routes and developing integrated multi-media guidelines.

PROJECT DESCRIPTION: Various organic compounds of interest to the Ministry and for which Ontario monitoring data exist will be selected in consultation with the Ministry. Extensive monitoring and emission data for these substances will be gathered and fitted to a statistical distribution to determine the spatially heterogeneous concentration distributions for these substances in various environmental phases such as air, water, sediment, soil, etc. on a regional basis. This capability will be combined with fugacity model to predict a range of concentrations rather than a single mean concentration for a compartment. ANTICIPATED RESULTS: The results will (i) validate and "calibrate" the fugacity model, thus providing a useful tool for the Ministry in assessing the behaviour of existing and new chemicals in the Ontario Environment, (ii) provide information about the most important routes by which humans are exposed to these chemicals, (iii) provide information on likely concentration levels of new and existing chemicals in the environments, thus improving the effectiveness of analytical monitoring programs.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	6.5	7.0	7.6	21.1
	Salaries :	30.4	31.9	33.4	95.7
Budget	Total :	36.9	38.9	41.0	116.8
Source: RAC	Man Years :	2.3	2.3	2.3	6.9

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Confs., 1984 and 1985

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 25, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Degradation of Organic Contaminants
by Anaerobic Bacteria in Lake Ontario Sediments

PROJECT NO: 195G
START DATE: (m/yr): 06/85
RES. PRIORITY:

SHORT TITLE: Organics-Anaerobic Bacteria

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. M. Goldner and Dr. C. Wyndman
and Affiliation: University of Toronto

LIAISON OFFICER: Deo Persaud - Water Resources Branch
(name, location, phone no.) 323-4926

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To determine whether anaerobic bacteria in Lake Ontario sediments can degrade xenobiotics (simple and more complex) using slurry enrichments and sediment/water cores. 2. To correlate breakdown rates with cell density in small cores from various locations on Lake Ontario. 3. To enrich, isolate and characterize bacteria in a degradative consortium. 4. To fit rates and bacterial counts to a model in order to predict, within limits, the fate of specific contaminants in situ.

PROJECT DESCRIPTION: The project addresses the problem of contaminant deposition in sediments by assessing the capability of indigenous anaerobes to degrade both simple and more complex man-made compounds. Slurry enrichments and sediment/water cores will be utilized to measure breakdown rates and bacterial densities. After statistical analysis these data will be fitted to a model, either one published or to be developed. Bacteria making up a degradative consortium will be enriched, isolated, and characterized by standard procedures carried out under stringent anaerobic conditions.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	13.0	11.0	12.6	36.6
	Salaries :	18.9	20.0	19.3	58.2
Budget	Total :	31.9	31.0	31.9	94.8
Source: RAC	Man Years :	1.4	1.5	1.4	4.3
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: Principal investigator changed due to death of Dr. J. Hoeniger. An increase in project cost of \$3500 was granted to cover additional equipment cost.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 22, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Validation and a Possible Reassessment
of Clam Caging Experiments using Elliptio
Complanatus as Biomonitor for Toxic Contaminants
in Water

PROJECT NO: 196G
START DATE: (m/yr): 04/85
RES. PRIORITY:

SHORT TITLE: Clam Caging

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. P. Hebert, Great Lakes Institute
and Affiliation: University of Windsor

LIAISON OFFICER: Mr. Allan Hayton - Water Resources Branch
(name, location, phone no.) 235-5803

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To assess the validity of using Elliptio Complanatus for monitoring water quality in the Great Lakes and to make recommendations on the use in situ populations of Lampsilis Radiata - a clam native to both the Great Lakes, rivers and other lakes in Ontario.

PROJECT DESCRIPTION: A series of field experiments will be carried out to provide answers to the following questions:

- 1) Does caging affect the amount or type of contaminant found in clam tissues?;
- 2) Is seasonal variation evident in the contaminant loads of native clams (L. Radiata) from a specific site, and are these patterns similar in male and female clams?;
- 3) How long does it take for clams moved from a "clean" environment to a contaminated site to accumulate the same contaminant load as native clams resident in the contaminated habitat?;
- 4) Conversely, how long does it take for clams transplanted from a "dirty" to a clean site to lose their contaminant loads?;
- 5) Does E. Complanatus work as well or better than "clean" L. radiata as a biomonitor?

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
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EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	6.6			6.6
	Salaries :	12.1			12.1
Budget	Total :	18.7			18.7
Source: RAC	Man Years :	0.9			0.9

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1985

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 25, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Monitoring the Chemical and
Biological Impact, as Measured by Physiological
Stress in Fish, of Episodic Events of Acid
Precipitation and Snow Melt

PROJECT NO: 197G
START DATE: (m/yr): 04/85
RES. PRIORITY:

SHORT TITLE: Acid Precip./Snowmelt MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. Harold H. Harvey, Professor of Zoology
and Affiliation: University of Toronto

LIAISON OFFICER: Dr. P.J. Dillon - Dorset Research Centre
(name, location, phone no.) (705) 766-2412

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To determine if the observed perturbations of fish populations in MOE calibrated lakes Crosson and Heney are related to the observed pH depressions in these lakes during episodic acid loading. To determine if the observed physiological stress and mortality of fish at Plastic Lake and Milford Bay occur in other waters susceptible to acidification. To use the resulting data in acid loading models and to relate specific acid loading events to both sources of SO₂ and NO_x, and to effects on the biota.

2 x

PROJECT DESCRIPTION: It is proposed that endemic white suckers and hatchery rainbow trout be held at several sites and depths in lakes Crosson and Heney. The fish will be monitored for stress by measuring blood and muscle ions at intervals, before, during and after acid pulses from rain and snow events. Water chemistry, including Al speciation, will be determined concurrently. Subsequently this in situ toxicity testing will be extended to other lakes in the Black River drainage which are susceptible to acidification. The results will help to define how widespread are the Plastic Lake phenomena of fish kills and fish stress.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	6.0	6.7		12.7
	Salaries :	14.1	14.1		28.2
Budget	Total :	20.1	20.8		40.9
Source: RAC	Man Years :	1.2	1.2		2.4

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 25, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Humber River/Black Creek: Detailed
Bacteriological Water Quality Study Examining the
Impact of Sediment and Survival Times

PROJECT NO: 198G
START DATE: (m/yr): 04/85
RES. PRIORITY:

SHORT TITLE: Humber River/Black Creek

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. P. Seyfried,
and Affiliation: University of Toronto

LIAISON OFFICER: Z. Novak - Water Resources Branch
(name, location, phone no.) 323-4804

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S):
1) To determine the extent of bacterial exchange between sediment and water
as a result of resuspension of sediment.
2) To determine survival times of fecal indicator bacteria in the Humber River environment.
3) To provide information required for methods being developed for inferring original
sources of fecal pollution by identifying bacteria present at study sites.
4) Determining loadings, potential for sediment transport and deposition capacity of
different source types.

PROJECT DESCRIPTION: To examine loadings and the effect of sediment resuspension, samples
will be obtained at, above and below 5 different source inputs for 2 different conditions
- undisturbed and agitated sediments. Levels of all fecal indicator bacteria currently
employed in surveys by the Ministry will be assessed as well as sediment content.
Meteorological and flow conditions will also be determined.

To assist in the development of a method for tracing and identifying sources of fecal
pollution fecal streptococci will be isolated and identified in conjunction with the
above study. Information on populations present will be interpreted along with data
currently being obtained on the fecal streptococcal populations in human and non-human
feces.

Survival times of fecal indicator bacteria will be determined in environmental
testing chambers designed for this purpose. Studies will be conducted in situ at each of
the five locations.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	41.0			41.0
	Salaries :	57.0			57.0
Budget	Total :	98.0			98.0
Source: RAC	Man Years :	5.0			5.0

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: Final report under revision.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 22, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Bioaccumulation of Mercury by Yellow Perch

PROJECT NO: 199G
START DATE: (m/yr): 04/85
RES. PRIORITY:

SHORT TITLE: Mercury in Perch

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. D.J. McQueen, Department of Biology
and Affiliation: York University

LIAISON OFFICER: K. Suns - Water Resources Branch
(name, location, phone no.) 235-5798

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop a model for the bioaccumulation of mercury in young-of-the-year yellow perch. The model will be used to explain inter-lake variation in mercury body burdens.

PROJECT DESCRIPTION: Three Precambrian Shield lakes in the Dorset area will be sampled to obtain: 1) the data required to develop a mercury bioaccumulation model; 2) seasonal data on net accumulation of mercury by yellow perch through their first year of life.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	21.3			21.3
	Salaries :	7.7			7.7
Budget	Total :	29.0			29.0
Source: RAC	Man Years :	0.7			0.7
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 26, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: PAH Analysis of Environmental
Samples at Low Temperature using Fluorescence
Detection

PROJECT NO: 200G
START DATE: (m/yr): 04/85
RES. PRIORITY:

SHORT TITLE: PAH Analysis

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Drs. S.V. Filseth, F.J. Morgan, and C.M. Sadowski
and Affiliation: Faculty of Science, York University

LIAISON OFFICER: G. Crawford - Laboratory Service Branch
(name, location, phone no.) 235-5757

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop a method for PAH Analysis of environmental samples by low Temperature Fluorescence Spectroscopy, and to examine the utility of Shpol'skii Spectroscopy for computer based data acquisition and processing in order to identify a selected group of PAH compounds.

PROJECT DESCRIPTION: Environmental samples will be examined after the different preparatory stages currently required for analysis. Shpol'skii Spectroscopy using a narrow spectral band laser as an excitation source will be used to identify a selected group of carcinogenic PAHs. Additionally, the suitability of Shpol'skii Spectroscopy for computer-based data acquisition and processing will be examined in order to identify a selected group of PAH compounds.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	14.9	9.1	11.4	35.4
	Salaries :	7.0	7.6	8.2	22.8
Budget	Total :	21.9	16.7	19.6	58.2
Source: RAC	Man Years :	2.2	2.2	2.2	6.6

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Confs., 1985 and 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: Additional funding in the amount of \$10,000 was granted for the purchase of laser equipment.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited Date : May 25, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Estimation of Ambient Water Qualities in Ontario Rivers to Identify and Manage Potential Water Quality Problems PROJECT NO: 201G
START DATE: (m/yr): 07/85
RES. PRIORITY:

SHORT TITLE: Water Quality MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. T.E. Unny,
and Affiliation: University of Waterloo

LIAISON OFFICER: Dr. Lloyd Logan - Water Resources Branch
(name, location, phone no.) 323-4984

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To quantify, on the basis of historical record, the uncertainties in water quality parameters in Ontario rivers and to develop a basis to assess the effect of variations of these parameters on decision-making with regard to protection against risk to the environment due to stream degradations.

PROJECT DESCRIPTION:

- quantify existing ambient quality data
- derive probability distributions of selected parameters
- develop statistical trend approaches
- derive uncertainty trends in relation to potential water quality problems
- develop concise stochastic models to represent current loadings and effects from management generated scenarios
- test the derived models

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
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EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	7.5			7.5
	Salaries :	20.0			20.0
Budget	Total :	27.5			27.5
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports): Report, 1986; Paper presented at CCIW Workshop, 1985; Paper presented at Tech. Trans. Conf., 1986; Paper presented at PAHS Symposium 1987

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: A Full Scale Study of the Effect
of Wastewater Variable on the Efficacy of
Ultraviolet Disinfection PROJECT NO: 202C
START DATE: (m/yr): 07/85
RES. PRIORITY:

SHORT TITLE: UV Disinfection **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator Dr. G.E. Whitby
and Affiliation: Trojan Technologies Inc.

LIAISON OFFICER: G. Palmateer - MOE (SW Region)
(name, location, phone no.) (519) 661-2600

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To create a better understanding of the UV disinfection process at the full scale level by: a) reduction of UV transmission of effluent, b) reduction of effluent quality with primary and secondary solids, c) determination of photoreactivation and dark reactivity in situ, d) determination of efficiency of disinfection at mid-point and end-point of lamp life, e) determination of correlation between bacteriophage and E. coli; f) lamp output versus sensor response, and g) mathematical modelling versus measured parameters.

PROJECT DESCRIPTION: A full scale UV system will be subjected to a series of test situations which will provide the data for the above objectives. The test situations will include such parameters as reduced UV transmission, high suspended solids and different types of effluents. Various indicator organisms and pathogens will be enumerated before and after photoreactivation. Mathematical models will be examined.

BUDGET AND RESOURCES:		Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)					
	Operating:	40.8				40.8
	Salaries :	32.9				32.9
Budget	Total :	73.7				73.7
Source:RAC	Man Years :	1.1				1.1
INTERNAL PROJECTS	Cost: (000's)					
	Operating:					
	Salaries :					
Budget	Total :					
Source:	Man Years :					

OUTPUT (papers, presentations, reports): American Soc. Mircrobiology (Altantic, Georgia, 1987); Water Pollution Control Federation Conference - Virginia, New England, Utah, Illinois, 1986.

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited Date : May 25, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Effects of Rural and Suburban Development on Surface Water Quality in Five Selected Subwatersheds in The Upper Humber River

PROJECT NO: 203G
START DATE: (m/yr): 07/85
RES. PRIORITY:

SHORT TITLE: Upper Humber Waste Quality MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Brian Hindley, Project Biologist
and Affiliation: Metropolitan Toronto & Region Conservation Authority

LIAISON OFFICER: K. Willson - Water Resources Branch
(name, location, phone no.) 323-4820

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To estimate sediment volumes and pollutant loadings from a forested, undisturbed watershed; an urban construction site; rural cultivated lands and stream bank erosion.
2. To estimate bacterial and suspended sediment loadings and the degree of water quality impairment to a stream from unrestricted livestock access.

PROJECT DESCRIPTION: Water and sediment sampling stations will be established on several small tributaries of the Humber River to investigate pollutant loadings from the above land use problems. Contributions to instream water quality impairment will be assessed relative to Provincial Water Quality Objectives.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	50.0	15.0		65.0
	Salaries :	56.3			56.3
Budget	Total :	106.3	15.0		121.3
Source: RAC	Man Years :	2.7	0.7		3.4

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : 01/06/87
Revision:

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Proposal to prepare a case history
of cheese whey concentration by reverse osmosis

PROJECT NO: 204C
START DATE: (m/yr): 16/01/86
RES. PRIORITY:

SHORT TITLE: Reverse Osmosis

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator F.A. Tonelli, Vice-President,
and Affiliation: Zenon Environmental Inc.

LIAISON OFFICER: Walter Suboch - Water Resources Branch
(name, location, phone no.) 323-4884

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To document the background leading to the application of osmosis technology for concentration of cheese whey for cattle feed.
2. To observe and monitor the process in operation at a Canadian cheese plant, in terms of process efficiency and environmental compliance.
3. To provide a technical, environmental, and economic evaluation of the process and equipment utilized and make recommendations for design and operating practices at a new installation of similar scale.

PROJECT DESCRIPTION: Background information necessary to evaluate reverse osmosis technology will be collected. Environmental regulations and programs relevant to pollution abatement caused by whey, and samples of feed, concentrate and permeate will be collected and analyzed for operational parameters.

Final evaluation of the method will include technical and economic efficiency as well as the degree of compliance with environmental requirements.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	16.6			16.6
	Salaries :	7.3			7.3
Budget	Total :	23.9			23.9
Source: RAC	Man Years :	0.3			0.3

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : May 28, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Evaluation of Native Marsh Plant
Species for Treatment of Domestic Sewage

PROJECT NO: 205C
START DATE: (m/yr): 10/85
RES. PRIORITY:

SHORT TITLE: Marsh Evaluation

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator John H. Neil, President
and Affiliation: Limnos Ltd.

LIAISON OFFICER: D. Snell - Water Resources Branch
(name, location, phone no.) 235-5822

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1) Review of literature pertaining to the use of alternative marsh species for sewage treatment, the establishment of cells for the comparison of three native species, to develop cultural practice for scale-up and to predict the treatment capability of a fully operating system.
2) To evaluate capacity of duckweed species for removal of ammonia from secondary effluents.

PROJECT DESCRIPTION: 1. Experimental cells will be developed and designated marsh species to be planted under controlled conditions.
2. Implementation of monitoring program.
3. Evaluation of the efficiency of treatment for each developed cell.

The project will provide the Ministry with information on the efficacy of marsh treatment of domestic sewage.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	23.5			23.5
	Salaries :	37.7			37.7
Budget	Total :	61.2			61.2
Source: RAC	Man Years :	0.9			0.9

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Screening Methods for Air and Water Samples: Application of Inductively Coupled Plasma Mass Spectrometry (ICP/MS) to Elemental Analysis PROJECT NO: 207G
START DATE: (m/yr): 06/85
RES. PRIORITY:

SHORT TITLE: Screening Methods ICP

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator and Affiliation: Drs. J.B. French (UTIAS) and Jon C. Van Loon (IES)
University of Toronto

LIAISON OFFICER: D. Boomer - Laboratory Services Branch
(name, location, phone no.) 235-5858

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S):

1. To develop ICP/MS methods for multielement analyses of solid and liquid environmental materials.
2. To develop ICP/MS as detector for liquid and gas chromatography columns to determine the chemical form of metals.
3. To extend above to include isotopic ratio studies
4. To verify the developed methods

PROJECT DESCRIPTION: An electrothermal atomizer will be developed for direct sample introduction into the ICP/Mass Spectroscopy System. The developed methods for the analyses of gas or liquid chromatographic effluents would allow for the determination of the chemical form of toxic metals in air and water samples. The methods will further be extended to allow for the determination of isotopic ratios. The developed methods and technologies will be transferred for use in MOE laboratory.

BUDGET AND RESOURCES:		Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS		Cost: (000's)				
		Operating:				
		Salaries :				
Budget	Total :	45.0	45.0	45.0		135.0
Source: RAC	Man Years :					
INTERNAL PROJECTS		Cost: (000's)				
		Operating:				
		Salaries :				
Budget	Total :					
Source:	Man Years :					
OUTPUT (papers, presentations, reports):						
Paper presented at Tech. Trans. Conf., 1986						
EXTERNAL PARTICIPATION (ministries, governments, agencies):						

NOTE: "External" refers to projects carried out by investigators outside the Ministry.

EXTERNAL X Contract Solicited Date : May 26, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Waste Management Planning for Pharmaceutical Industry **PROJECT NO:** 209G
START DATE: (m/yr): 11/85
RES. PRIORITY:

SHORT TITLE: Pharmaceutical
Industry **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator Dr. Robert A. Stairs, Errol G. Lewars and R. Makeja
and Affiliation: Department of Chemistry, Trent University

LIAISON OFFICER: J. Manuel - Waste Management Branch
(name, location, phone no.) 323-5125

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To assess present practice and regulations, types and quantities of pharmaceutical wastes, storage, handling and disposal.
2. To recommend changes in practice or regulations, as appropriate. To promote occupational and environmental safety and to effect economies, if possible.

PROJECT DESCRIPTION: By consultation (with industry, Ministry and OWMC personnel), by questionnaire and on-site visits, data will be collected on nature, quantities, hazards to workers or environment, of all wastes generated by pharmaceutical manufacturing. This will include process wastes as well as unwanted products. Current procedures and facilities will be assessed, and desirable changes considered in the light of current or proposed regulations.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	2.4	2.2	2.4	7.0
	Salaries :	16.6	16.6	10.6	43.8
Budget	Total :	19.0	18.8	13.0	50.8
Source: RAC	Man Years :	1.9	1.9	1.2	5.0
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Confs. 1985, 1986, and 1987

EXTERNAL PARTICIPATION (ministries, governments, agencies):
OWMC

COMMENTS.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : May 29, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

**PROJECT TITLE: To Develop the GC/MED System as Non
GC/MS Screening Technique**

PROJECT NO: 211C
START DATE: (m/yr): 04/86
RES. PRIORITY:

SHORT TITLE: G.C./Med. System

MBB PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. Lucy Danylewych-May
and Affiliation: Barringer Magenta Limited

LIAISON OFFICER: Patricia Baulu - Laboratory Services Branch
(name, location, phone no.) 235-5753

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To assess the GC/MED analytical system as a non GC/MS technique for the determination of C, Cl, Br, F, P, and S in hazardous waste and its application for the analysis of volatile and non-volatile contaminants.

PROJECT DESCRIPTION: In this phase of a broader study, the MED system will be developed and optimized to meet MOE requirements for the analysis of hazardous wastes.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	7.0			7.0
	Salaries :	56.0			56.0
Budget	Total :	63.0			63.0
Source: RAC	Man Years :	1.6			1.6

INTERNAL PROJECTS Cost: (000's)
Operating:
Salaries :
Budget Total :
Source: Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: Project has been extended until October 1987 as requested by Barringer.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NEP etc.)

EXTERNAL X Contract Solicited Date : May 26, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Monitoring Environmental Genotoxicity PROJECT NO: 212G
Using Sister Chromatid Exchanges in Mice START DATE: (m/yr): 07/85
RES. PRIORITY:

SHORT TITLE: Environmental Genotoxicity MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. Michael L. Petras, Department of Biology
and Affiliation: University of Windsor

LIAISON OFFICER: Dr. M. Salamone - Water Resources Branch
(name, location, phone no.) 235-5790

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To continue evaluating the feasibility of using sister chromatid exchanges (SCE) in both wild and inbred (laboratory) mice as a first-line monitoring system for environmental genotoxicity. Such a system could use either animals that are already in place (natural pollution) or mice that are placed in corn-filled containers at sites to be monitored.

PROJECT DESCRIPTION: The basic approach involves comparing SCE levels in mice that have been exposed to a particular environment with SCE levels in control mice. If a genotoxin is present in the environment being studied, the SCE level will exceed that seen in the controls. The specific objectives of this phase include:

1. The effect of a crisis situation (high genotoxic level) on SCE counts;
2. The effects of the modes of administration of several encountered genotoxins;
3. The duration of genotoxic effect after exposure to an agent;
4. The variability of response in wild mice to several known mutagens;
5. Procedures to enhance the sensitivity of the SCE technique.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	14.7	27.9	28.3	70.9
	Salaries :	18.0	19.0	20.0	57.0
Budget	Total :	32.7	46.9	48.3	127.9
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Confs., 1985 and 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 26, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Effect of Increasing Amounts of
Non-Polar Organic Liquids in Domestic Waste
Leachate on the Hydrodraulic Conductivity of Clay
Liners in Southern Ontario

PROJECT NO: 213G
START DATE: (m/yr): 08/85
RES. PRIORITY:

SHORT TITLE: Waste Leachate

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. R.M. Quigley, Faculty of Engineering Science
and Affiliation: University of Western Ontario

LIAISON OFFICER: M. Goodwin - Waste Management Branch
(name, location, phone no.) 323-5217

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To determine the threshold concentrations of selected, non-polar, low dielectric liquid hydrocarbons added to domestic waste leachate, at which large increases in hydraulic conductivity of natural and/or compacted clay barriers would occur.

PROJECT DESCRIPTION: Raw domestic waste leachate, contaminated with added liquid hydrocarbons and methanol as an association liquid, will be passed through clay samples at high gradients and constant flow rates. A new computer-controlled fixed ring permeameter system will be used for the measurement of k versus pore volumes passed through. Chemical control of the influent and effluent liquids will be maintained by gas chromatograph and AA equipment. Selected industrial wastes will also be passed through the samples. Weathered brown clays from the Sarnia area will be the test soils.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	5.0	5.0		10.0
	Salaries :	19.0	19.0		38.0
Budget	Total :	24.0	24.0		48.0
Source: RAC	Man Years :	1.4	1.4		2.8

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports): "Effect of Viscosity on the Hydraulic Conductivity of Clayey Soils Permeated with Water Soluble Organics" - F. Fernandez; R.M. Quigley; 40th Canadian Geotechnical Conference, Regina, October 1987.
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited Date : May 26, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Evaluation of Contaminant Velocity PROJECT NO: 214G
Groundwater in low-permeability Fractured Shale START DATE: (m/yr): 08/85
RES. PRIORITY:

SHORT TITLE: Fractured Shale MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Drs. J. Cherry and Ed Sudicki, Institute for Groundwater
and Affiliation: Research, University of Waterloo

LIAISON OFFICER: A. Scott - Waste Management Branch
(name, location, phone no.) 323-5218

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To evaluate several methods for determining the average velocity of non-reactive contaminants in shale of low permeability, to assess the velocity and matrix diffusion effects in low permeability, but probably high velocity zones in the Queenston shale, and to determine how long it will take for contaminants to migrate from landfills in the Burlington-Hamilton area to Lake Ontario.

PROJECT DESCRIPTION: The study will consist primarily of field tests at two or three locations on fractured Queenston shale in the vicinity of the Bayview Park landfill or the nearby Burlington landfill. The test sites will be instrumented with a network of cored holes, multilevel piezometers and wells. Hydraulic tests will be conducted to determine the effective bulk fracture porosity of the shale so that the Darcy equation can be used to obtain estimated values of average contaminant transport velocity under natural gradients. Borehole dilution tests will be done to determine velocity values in single boreholes. The test sites will be in zones of low permeability so that the hypothesis of high contaminant velocity in low permeability zones can be evaluated.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	19.2	19.2	10.6	49.0
	Salaries :	14.5	14.5	12.0	41.0
Budget	Total :	33.7	33.7	22.6	90.0
Source: RAC	Man Years :	1.0	1.0	0.8	2.8

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : May 27, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Biological Indicator System to
Identify Genotoxicity of In-Place Pollutants

PROJECT NO: 215C
START DATE: (m/yr): 01/86
RES. PRIORITY:

SHORT TITLE: Biological Indicator

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. J. Fitchko, Manager
and Affiliation: IEC Beak Consultants Ltd.

LIAISON OFFICER: J. Ralston - Water Resources Branch
(name, location, phone no.) 323-4924

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop a reliable biological indicator test system to evaluate the biological effects-genotoxicity of in-place pollutants on chironomids.

PROJECT DESCRIPTION: A biological indicator test system will be further developed and evaluated using Chironomids collected at polluted and non-polluted waters.

Deformity evaluation for Chironomids from sources not affected by radionuclides will be carried out to substantiate that deformity response is chemically induces.

This project is phase 1 of a broader proposal.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	1.7			1.7
	Salaries :	8.3			8.3
Budget	Total :	10.0			10.0
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):
Additional cost covered by IEC Beak

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : May 28, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development of Guidelines to Control PROJECT NO: 217C
the Disposal of Wastes as Backfill Material in Ontario START DATE: (m/yr): 09/85
RES. PRIORITY:

SHORT TITLE: Waste Disposal

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Richard J. Rush, Vice President & Senior Project Manager
and Affiliation: Canviro Consultants Ltd.

LIAISON OFFICER: D. Hickman - Waste Management Branch
(name, location, phone no.) 323-5206

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. Review of guidelines related to backfill of wastes.
2. To prepare an inventory of major industrial sources of inert fill material and to describe leachate characteristics.
3. Development of a process for the classification of inert fill material.
4. Development of a preliminary set of criteria for backfill applications.

PROJECT DESCRIPTION: This study includes a survey of wastes used for backfill in Ontario and a review of current practices in Ontario and any existing guidelines of other jurisdictions in order to develop new guidelines for use by the Ministry in support of the implementation of Regulation 309.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	2.0			2.0
	Salaries :	24.9			24.9
Budget	Total :	26.9			26.9
Source: RAC	Man Years :				
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 26, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Sewage Sludge Compost as Turf Fertilizer

PROJECT NO: 218G
START DATE: (m/yr): 08/85
RES. PRIORITY:

SHORT TITLE: Turf Fertilizer

MBB PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. J.L. Eggens, Department of Horticultural Science
and Affiliation: University of Guelph

LIAISON OFFICER: N. Ahlberg - Waste Management Branch
(name, location, phone no.) 323-5189

INTERNAL PROJECTS

INTERNAL PROJECTS
Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To evaluate the usefulness of sewage sludge compost as a replacement to milorganite as a fertilizer for golf course fairways as well as for other applications (home lawns, athletic fields, sod farms, etc.)

PROJECT DESCRIPTION: Laboratory and field work will be carried out to observe the influence of the compost on wear tolerance, environmental stress, disease, recuperative potential, thatch accumulation and playing quality of high maintenance heavily used turf.

Successful completion of the project will provide a commercial sewage sludge fertilizer that would replace Milorganite in the marketplace. Minor nutrient formulation amendments may be necessary.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	6.9	7.1	7.6	21.6
	Salaries :	15.5	16.2	17.0	48.7
Budget	Total :	22.4	23.3	24.6	70.3
Source: RAC	Man Years :	2.0	2.0	2.0	6.0

INTERNAL PROJECTS Cost: (000's)
Operating:
Salaries :
Budget Total :
Source: Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf.. 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, QFAC, WRB, NER etc.)

EXTERNAL X Contract Solicited Date : May 26, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Dose Response for Selected Environmental Air Pollution on Selected Populations PROJECT NO: 219G
START DATE: (m/yr): 10/85
RES. PRIORITY:

SHORT TITLE: Dose Response of Air Pollution **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator Frances Silverman, R.J. Shephard and P. Corey
and Affiliation: University of Toronto

LIAISON OFFICER: W. Chan - Air Resources Branch
(name, location, phone no.) 965-4081

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To examine effects of ambient urban air pollution on cardiorespiratory health and exercise performance in runners by: a) Establishing if a difference exists between 1) stationary monitoring at a central downtown station, 2) stationary monitoring at the running route, and 3) mobile site monitoring to approximate personal exposure; b) Establishing if an impairment in pulmonary function and exercise performance, an increased COHb% or increase in respiratory symptoms occur due to exposure; c) Evaluating by multiple regression analysis any such changes with the level of pollutants for each of the monitoring sites; d) Relating sensitivity to pollutants as measured by the multiple regression coefficients to general health effects (sick days, symptoms, performance times in races).

PROJECT DESCRIPTION: Subjects will be selected from the Longboat Road Runners Club and followed during weekly training runs and selected races. Measurements include: pulmonary function and carboxyhaemoglobin (COHb) measured before and after running, performance, subjective evaluations, symptoms, sick days, doctor visits, hospital days and an updated version of the Cornell Medical Index will be applied. Pollutants measured will include sulphur dioxide, nitrogen dioxide, ozone, CO and inhalable particulate matter, etc. along with environmental covariates (temperature, humidity, wind velocity, etc.) for each training run. Existing central station monitoring will be supplemented by the Gage samplers (for sulphur dioxide, nitrogen dioxide and particulate matter) placed at the central station at the starting location of the running routes and carried bicycles following alongside the runners. Statistical comparisons include pollutant type (nitrogen dioxide, sulphur dioxide, etc.), pulmonary function, COHb and performance changes, and differences attributable to methods, types, and locale of pollutant monitoring.

BUDGET AND RESOURCES: Year: (* current) 1 2 * 3 **TOTAL**

EXTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total : 	69.0	60.0	40.0	169.0
Source: RAC	Man Years :				

INTERNAL	Cost: (000's)
PROJECTS	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Poster paper at TTC. 1987

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, QPAC, WRR, NER etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 26, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Mutagenicity of Complex Mixtures of Polycyclic Aromatic Hydrocarbons in Ambient Air Particulate Matters (APM)

PROJECT NO: 220G
START DATE: (m/yr): 10/85
RES. PRIORITY:

SHORT TITLE: Mutagenicity of PAH

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. J.A. Heddle
and Affiliation: York University

LIAISON OFFICER: Dr. G. Diamond - Air Resources Branch
(name, location, phone no.) 965-4081

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To study mutagenic and carcinogenic potential of polycyclic hydrocarbons in ambient air particulate matter and to determine the hazard and mutagenic risk of their mixture.

PROJECT DESCRIPTION: Mixtures of PAH's will be extracted from air particulate matter and subsequently tested for mutagenic activity. The findings will be compared with those on US-NBS standard material as well as with individual PAH mutagenicity data.

The results will be used to assess the effects and mechanisms of PAH's on the enzyme system and will provide the Ministry with new knowledge in the activity, toxicity, and dose-response relationships of chemical mutagens.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	23.5	23.5		47.0
	Salaries :	80.3	80.3		160.6
Budget	Total :	103.8	103.8		207.6
Source: RAC	Man Years :	3.4	3.4		6.8

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1985 and 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL	Contract X	Solicited	Date : May 28, 1987
INTERNAL X	Grant	Unsolicited	Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Building Wake Study at Darlington	PROJECT NO: 221C
	START DATE: (m/yr): 04/86
	RES. PRIORITY:

SHORT TITLE: Darlington Bldg. Wake	MBR PROJECT CATEGORY:
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EXTERNAL PROJECTS

Principal Investigator
and Affiliation:

LIAISON OFFICER:

(name, location, phone no.)

INTERNAL PROJECTS

Principal Investigator: H. Sahota - Air Resources Branch
(name, location, phone no.) 235-5764

SUPERVISOR: Dr. P.K. Misra

OBJECTIVE(S): To study the effects of building wake on the dispersion characteristics of any pollutant released from the building.

PROJECT DESCRIPTION: Dispersion of hazardous contaminants data will be investigated and used to establish a reliable air pollution model. Air samples will be collected on an hourly basis, analyzed, and the findings will be correlated to meteorological information.

This study will be carried out in cooperation with Ontario Hydro with cost sharing between Air Resources Branch and Ontario Hydro.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
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EXTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

INTERNAL PROJECTS	Cost: (000's)
	Operating: 29.0
	Salaries : 15.0
Budget	Total : 44.0
Source: RAC	Man Years : 0.8

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract X Solicited X
INTERNAL Grant Unsolicited

Date : May 29, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Application of Robotics to the
Analysis of Trace Organics

PROJECT NO: 223C
START DATE: (m/yr): 01/86
RES. PRIORITY:

SHORT TITLE: Robotics

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Ms. Cecilia Chau
and Affiliation: Mann Testing Laboratories Ltd.

LIAISON OFFICER: G. Crawford - Laboratory Services Branch
(name, location, phone no.) 235-5757

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To design, test and deliver a robotics system to provide fully automated sample preparation of fish and biological tissues prior to analysis for trace organics.

PROJECT DESCRIPTION: The consultant will study MOE's current manual extraction and concentration methods for fish and will plan the hardware and software necessary to carry out the weighing, transfer, dissolution, extraction, extract isolation and steps necessary to provide a trace organics solvent extract prior to cleanup. The consultant will acquire appropriate hardware (modifying if necessary), computer controller etc. Will write and debug the necessary computer control software, will assemble and test the system on fish samples, in parallel with MOE analysis of split aliquots. Acceptance will be based on comparative performance of manual and robotic system.

The consultant will deliver and set up the system at MOE labs and will ensure it to be operational, and train MOE staff in its operation.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	119.5			119.5
	Salaries :	50.5			50.5
Budget	Total :	170.0			170.0
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract X
INTERNAL Grant

Solicited X
Unsolicited

Date : May 29, 1986
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development and Validation of a
Methodology for Assessing the Relative Environmental
Hazards of Chemical Contaminants

PROJECT NO: 226C
START DATE: (m/yr): 08/85
RES. PRIORITY:

SHORT TITLE: Screening Methods

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Cantox Inc.
and Affiliation:

LIAISON OFFICER: J. Smith - Hazardous Contaminant Coordination Branch
(name, location, phone no.) 323-5113

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): - to provide an operational, peer-reviewed risk identification methodology for standard setting
- to provide assessment criteria to evaluate the hazards of chemicals selected by HCCB, ARB, WMB, WRB and Regions
- to define the information gathering process for assessing the hazards of individual chemicals

PROJECT DESCRIPTION: This project represents the cornerstone of MOE's multi-media standard setting process. A tiered screening system for the identification and assessment of chemicals will be developed. Those chemicals of greatest concern will be screened at successive stages using more detailed information sources and more comprehensive criteria. Substances would be evaluated in terms of both their effects and exposure potential in Ontario. The magnitude of the exposure and the degree of the effects will be used to determine a concern level - high, medium, or low. The adequacy of the information upon which the concern is based will be used in establishing a confidence level - high, medium or low. Together, the parameters of concern and confidence will determine the relative priority for standard setting or other environmental management action based on the hazard of the substance. Thirty-two selected substances will be used to validate the methodology.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
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EXTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget Source: RAC	Total : Man Years :	100.0	100.0		200.0

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget Source:	Total : Man Years :				

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited Date : May 22, 1987
INTERNAL Grant X Unsolicited X Revision: October 19, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

EXTERNAL PROJECTS

Principal Investigator Dr. P. Fritz, Department of Earth Sciences
and Affiliation: University of Waterloo

LIAISON OFFICER: Dr. P. Dillon - Water Resources Branch (Dorset)
(name, location, phone no.) (705) 766-2412

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): The sulphur cycle in watersheds is initiated by fallout which subsequently interacts with the ecosystem in the soil and unsaturated zone. This portion of the cycle will be investigated with the aim to obtain information on the degree and/or type of precipitation of fallout sulphur in bio-geochemical reactions.

PROJECT DESCRIPTION: An intensive sampling and monitoring program of fallout, soil unsaturated zone, shallow groundwater and local runoff will be undertaken in at least two Dorset Watersheds (to be decided in collaboration with local research staff). Environmental isotope and chemical analyses will be done on sulfate and reduced sulfur from these environments. Samples collected will include 1) runoff and seeps from various precipitation counts, 2) continuous sampling of rainfall (designed for and "operated" by MOE personnel), 3) soil samples from a number of soil pits, 4) water soluble, exchangeable and total sulfur samples, separated from the soil samples and 5) water samples from the unsaturated zone and shallow groundwaters. Wherever possible this program will take advantage of ongoing studies to avoid duplication and to minimize sampling costs. Analyses will include 18^O and 2^H determinations on water, 13^C on dissolved inorganic carbon as well as 34^S and 18^O in sulfate from the various components.

**BUDGET AND
RESOURCES:** Year: (* current) 1 * 2 3 **TOTAL**

EXTERNAL PROJECTS	Cost: (000's)		
	Operating:	20.3	20.3
	Salaries :	6.0	6.0
Budget	Total :	26.3	26.3
Source: RAC	Man Years :	1.9	1.9

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The Feasibility of Biomass Removal
in Shallow Impoundments as a Means of Reducing
Nutrient Loading PROJECT NO: 229C
START DATE: (m/yr): 11/85
RES. PRIORITY:

SHORT TITLE: Biomass Removal **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator and Affiliation: K. Clarke-Whistler, J. Fitchko (Beak) and G. Gespary (CVCA)
Beak Consultant Ltd. and Credit Valley Conservation Authority

LIAISON OFFICER: Ken Nicholls - Water Resources Branch
(name, location, phone no.) 235-5810

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To determine the potential of biomass harvesting as a means of reducing nutrient loading from the Orangeville Reservoir to the Upper Credit River.
2. To identify nutrient input/output sources on a seasonal basis.

PROJECT DESCRIPTION: Nutrient inputs/outputs to and from the Orangeville Reservoir will be monitored for a full hydrological cycle. The nutrient load contained within vegetation and the water column of the reservoir will be determined on a seasonal basis. The percent of the total nutrient load removed via biomass harvesting will be determined, and a site-specific nutrient budget developed.

Anticipated Results: Aquatic vegetation is a major source of nutrients to downstream receiving systems, and biomass removal may prove to be an effective means of controlling nutrient loadings.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	11.1			11.1
	Salaries :	14.9			14.9
Budget	Total :	26.0			26.0
Source: RAC	Man Years :	0.3			0.3
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total				

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited Date : May 26, 1987
INTERNAL Grant X Unsolicited X Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development of an Ultrasonic Nebulizer for Stable and Reproductive Production of Aerosols for Atomic Spectrometric Analysis PROJECT NO: 230G
START DATE: (m/yr): 10/85
RES. PRIORITY:

SHORT TITLE: Ultrasonic Nebulizations MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. Jon C. Van Loon, Institute of Environmental Studies
and Affiliation: University of Toronto

LIAISON OFFICER: D. Boomer - Laboratory Services Branch
(name, location, phone no.) 235-5858

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): - To develop an inexpensive but reliable ultrasonic nebulizer system.
- To evaluate this device using AAS, ICP/AES and ICP/MS*.
- To transfer the technology to MOE.

* AAS-Atomic Absorption Spectrometry ICP/MS-Inductively Coupled Plasma/Mass Spectrometry
ICP/AES-Inductively Coupled Plasma Atomic Emission Spectrometry

PROJECT DESCRIPTION: A transducer/power supply system from a domestic ultrasonic humidifier has been used. The power supply has been modified for stability and proper impedance matching. Use of a coating directly on the transducer plate surface (compared to a bonded plate) is being investigated.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	8.1	10.2		18.3
	Salaries :	6.1	6.6		12.7
Budget	Total :	14.2	16.8		31.0
Source: RAC	Man Years :				1.1

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports): Paper presented at Tech. Trans. Conf., 1986
The report was used to fulfill the requirements for an M.Sc.

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: The final report has been received. The Report Approval Form is expected shortly from the Liaison Officer.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X	Contract X	Solicited	Date : May 27, 1987
INTERNAL	Grant	Unsolicited X	Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development of a Standard Clam Biomonitoring Methodology for the Detection of Trace Contaminants Within Waters of the Ontario Great Lakes Region	PROJECT NO: 231C
	START DATE: (m/yr): 05/86
	RES. PRIORITY:

SHORT TITLE: Clam Biomonitoring	MBR PROJECT CATEGORY:
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EXTERNAL PROJECTS

Principal Investigator A. Melkic, President
and Affiliation: Integrated Explorations

LIAISON OFFICER: A. Hayton - Water Resources Branch
(name, location, phone no.) 235-5803

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. Assess the adequacy of supplies of uncontaminated clams.
2. Seek sources of alternative species from varied environments.

PROJECT DESCRIPTION: 1. Evaluate standing stocks in Balsam Lake
2. Explore other lakes for additional sources of various clam species

Anticipated Results: - Standing stock, size distribution and spatial extent of presently used clam bed.
- Location of other clam beds within Balsam Lake.
- New sources of clams outside of Balsam Lake.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	42.0			42.0
	Salaries :	9.5			9.5
Budget Source: RAC	Total :	51.5			51.5
	Man Years :				

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget Source:	Total :				
	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : May 28, 1987
Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Determining Sulphur Dioxide Mass
Emission Fluxes by Stack Scanning: Phase II

PROJECT NO: 232C
START DATE: (m/yr): 10/85
RES. PRIORITY:

SHORT TITLE: Sulphur Dioxide Stack Scanning

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator R.C. Mitchner, Applications Engineer
and Affiliation: Moniteq Limited

LIAISON OFFICER: D. Maftei - Air Resources Branch
(name, location, phone no.) 965-5776

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To continue the initial investigation into determining sulphur dioxide concentrations in stack exhausts by remote scanning from a fixed platform. To evaluate the performance of the sensor in this configuration and identify the important operational parameters. Recommendations on its use as an operational tool will be presented.

PROJECT DESCRIPTION: (i) Modify the sensor to optimize its performance in this configuration.

(ii) Manufacture a scanning platform

(iii) Conduct a series of laboratory experiments to define its performance.

ANTICIPATED RESULTS;

A modified Plumetracker instrument will be built and tested in the laboratory.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	26.5			26.5
	Salaries :	15.5			15.5
Budget	Total :	42.0			42.0
Source: RAC	Man Years :	0.5			0.5
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1985

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development of Polysulfide Technology
for Treatment of Concentrated Spent Cyanide Liquors **PROJECT NO:** 233G
START DATE: (m/yr): 03/86
RES. PRIORITY:

SHORT TITLE: Cyanide Liquors **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator Dr. J.J. Ganczarczyk, Department of Civil Engineering
and Affiliation: University of Toronto

LIAISON OFFICER: A. Oda - Waste Management Branch
(name, location, phone no.) 323-5129

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop a simple, safe and inexpensive method for detoxification of concentrated spent cyanide liquors generated in electroplating shops.

PROJECT DESCRIPTION: Polysulfide reacts with cyanide forming thiocyanate which may also be partially decomposed by an excess of polysulfide; sulfide and hydroxide ions present in the reagent precipitate heavy metals in the spent liquors; feasibility of this treatment method has been confirmed in previous studies, but several technological questions remain unanswered.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	11.0			11.0
	Salaries :	22.0			22.0
Budget	Total :	33.0			33.0
Source: RAC	Man Years :	0.6			0.6
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports): 1) Report, "Development of Polysulfide Technology for Treatment of Concentrated Spent Cyanide Liquors"; 2) Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: Project is completed except for the final report.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

SHORT TITLE: Gasification with Plasma ARC **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator and Affiliation: A. Tsangaris and G. Carter, Resorption Canada Ltd.

LIAISON OFFICER: Pat DeAngelis - Waste Management Branch
(name, location, phone no.) 323-5130

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To demonstrate the operational and environmental benefits of plasma arc gasification of municipal solid waste (MSW) and its potential acceptability in Waste Management.

PROJECT DESCRIPTION: Resorption Canada Limited (RCL), OBOE Engineering Ltd and Ontario Hydro propose a feasibility study to conduct experimentation with MSW within the RCL plasma arc research facility to demonstrate the salient operational and environmental characteristics of such a process. The existing RCL plasma research facility is presently capable of gasification of MSW, however, it would require the optimization of some of its equipment plus the addition of some other equipment in order to permit the total operation results which would be required. The work schedule has been organized into two stages, stage 1 to determine the Higher Heating Value (HHV) of the product gas and the total process heat balance, and Stage 2 to determine the environmental acceptability of the process and the subsequent combustion of the product gas. Organization in this manner permits a decision point at the end of stage 1 to permit the assessment of the heat balance results obtained prior to the commencement of Stage 2. The expected duration of the project is 59 weeks.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	25.0	50.0		75.0
	Salaries :				
Budget	Total :	25.0	50.0		75.0
Source: RAC	Man Years :	1.2	0.5		1.7

INTERNAL PROJECTS	Cost: (000's)
Budget	Operating:
Source:	Salaries :
	Total :
	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at the Tech. Trans. Conf.. 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):
Cost sharing with the Ministry of Energy

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X	Contract X	Solicited	Date : May 27, 1987
INTERNAL	Grant	Unsolicited X	Revision: October 5, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Ottawa River Nuclear Spill Contingency Model Development - Phase II	PROJECT NO: 235C
	START DATE: (m/yr): 04/86
	RES. PRIORITY:

SHORT TITLE: Ottawa River Nuclear Spill - Phase II MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Drs. T.P. Halappa Gowda, M. Palmer and R. Janois
and Affiliation: Gore & Storrie Limited

LIAISON OFFICER: W. Scheider - Water Resources Branch
(name, location, phone no.) 323-4925

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To interface 1-D model algorithms with TWODIFIN model; to develop algorithms for special distributions at specified times; to carry out model validation studies; to optimize process parameters; to incorporate a user-specified graphical package; to develop algorithms for interactive model of execution, and to familiarize MOE staff on model operation aspects.

PROJECT DESCRIPTION: As part of the Ministry's nuclear spill contingency planning for the Ottawa River, Gore & Storrie developed the model TWODIFIN. It is proposed to make the model more versatile for use by incorporation features such as a graphical package and algorithms for 1-D predictions and spatial distributions. The model will be validated using the 1984 tracer study and 1981 tritium spill data.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	27.2			27.2
	Salaries :	12.8			12.8
Budget	Total :	40.0			40.0
Source: RAC	Man Years :	0.4			0.4

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The Use of Various Bacterial Short-Term Tests to Screen Industrial Effluents for Mutagenic Activity PROJECT NO: 237G
START DATE: (m/yr): 03/86
RES. PRIORITY:

SHORT TITLE: Bacterial Short-Term Test **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator Dr. D. Logan
and Affiliation: York University

LIAISON OFFICER: D. Rokosh - Water Resources Branch
(name, location, phone no.) 235-5787

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To evaluate the suitability of the Fluctuation Assay for mutagenicity testing for various industrial sectors, to screen industrial aqueous effluents for mutagenic activity and to set the priority for such effluents, based on their mutagenic activity, for additional genotoxicity testing.

PROJECT DESCRIPTION: Industrial effluent samples, to a maximum number of 30 from a variety of industrial sectors, including pulp and paper, mining and petrochemical, will be provided for testing by the Ministry of the Environment. These effluents will be screened for mutagenic activity, utilizing the Ames Plate Incorporation Assay and the Fluctuation Assay (reportedly more sensitive to mutagenic compounds than the plate incorporation assay). Effluents will be pH adjusted (if necessary) and sterilized (using pressure filtration) but their chemical concentration will not be altered. On completion of the testing a report will be prepared containing a summary of screening data and a ranking of samples based on their mutagenic activity. An attempt will be made to relate this activity with historical chemical analysis of effluents from specific industries.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	2.0			2.0
	Salaries :	10.0			10.0
Budget	Total :	12.0			12.0
Source: RAC	Man Years :				
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				
OUTPUT (papers, presentations, reports):					

Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract X Solicited
INTERNAL Grant Unsolicited X

Date : May 27, 1987
Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Water Use. Kraft Mills

PROJECT NO: 238C
START DATE: (m/yr):
RES. PRIORITY:

SHORT TITLE: Water Use Study

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Nicholas C.A. Felix, Project Manager
and Affiliation: Giffels Associates Limited

LIAISON OFFICER: W. Subboch - Water Resources Branch
(name, location, phone no.) 323-4884

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To investigate and report on
how water is used in Ontario's Kraft Mills, the potential for further
reduction of water usage and its impact on the quality of the effluent.

PROJECT DESCRIPTION: Each of nine Kraft mills will be visited to meet with the management; to examine the operations; and to collect the pertinent data for this study. The data will include information on the quality of water used per ton of product; procedures currently in place to conserve water; and the potential for alterations to the process to further reduce water usage.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	21.8			21.8
	Salaries :	12.4			12.4
Budget	Total :	34.2			34.2
Source: RAC	Man Years :	0.3			0.3

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Assessment of Contaminant Migration from Industrial and Landfill Sources in the Twelve Mile Creek and Welland River Watersheds **PROJECT NO:** 240G
START DATE: (m/yr): 04/86
RES. PRIORITY:

SHORT TITLE: Twelve Mile Creek **MBR PROJECT CATEGORY:**

EXTERNAL PROJECTS

Principal Investigator and Affiliation: Dr. M. Dickman and Dr. I. Brindle, Biological Science and Chemistry Depts - Brock University

LIAISON OFFICER: Mr. S. Irwin - MOE Hamilton
(name, location, phone no.) (416) 521-7704

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To determine the industrial and agricultural sources and classes of organic contaminants and toxic metals in the Twelve Mile Creek and Welland River. 2. To estimate contaminant loadings of in-place pollutants in sediments. 3. To attempt to correlate the findings with the toxicity study currently being carried out with funds from the World Wildlife Fund and Department of Employment and Immigration 4. To establish a realistic model for the distribution and fate of the identified contaminants in sediments along the above water courses.

PROJECT DESCRIPTION: Detailed chemical analyses will be carried out on samples obtained from the Welland River and Twelve Mile Creek in an effort to identify the impact of in-place pollutants in sediments on the aquatic ecosystem, by investigating the availability of trace organics and heavy metals, in sediments, to aquatic biota. Water and sediment samples from a minimum of 50 locations at upstream and downstream sites in the two study areas will be analyzed and QA/QC will be maintained in cooperation with MOE labs.

ANTICIPATED RESULTS: Possible sources of industrial pollution and the fate of contaminants in the above water courses will be identified.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	122.9			122.9
	Salaries :	57.1			57.1
Budget	Total :	180.0			180.0
Source: RAC	Man Years :				
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)
RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 22, 1987
Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The Use of Aquatic Vegetation and Invertebrates to Monitor Chlorinated Hydrocarbons in the Lake Huron - Lake Erie Corridor

PROJECT NO: 241G
START DATE: (m/yr): 05/86
RES. PRIORITY:

SHORT TITLE: Lake Contamination

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. P.D.N. Hebert, Great Lakes Institute
and Affiliation: University of Windsor

LIAISON OFFICER: W. Scheider - Water Resources Branch
(name, location, phone no.) 323-4925

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): The research has three objectives: 1) to examine the factors affecting the uptake of selected organic contaminants by clams. 2) to examine the usefulness of aquatic vegetation in monitoring selected organic contaminants. 3) to carry out laboratory experiments to calibrate uptake rates (i.e. the relationship between body burden and water concentrations) to provide a basis for interpreting the field data, 4) to assess the concentration of toxic chemicals in major components of the Lake St. Clair biota and 5) to use the data to refine fate and transport models in the Lake St. Clair and St. Clair river.

PROJECT DESCRIPTION: Laboratory and field studies will be carried out to examine the factors affecting contaminant uptake by aquatic vegetation and mussels. Contaminant concentration in selected biotic compartments of Lake St. Clair will be determined. Existing models used for predicting the fate of toxic chemicals will be modified and applied to the St. Clair River and to Lake St. Clair.

BUDGET AND RESOURCES:	Year: (* current)	1	2 *	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	50.0	40.0	20.0	110.0
	Salaries :	50.0	60.0	30.0	140.0
Budget	Total :	100.0	100.0	50.0	250.0
Source: RAC	Man Years :	2.0	2.6	1.8	6.4
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL	X	Contract	Solicited
INTERNAL		Grant	X
			Unsolicited X

Date : May 22, 1987
Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Toxicity of Pentachlorophenol to Zooplankton: Fate and Effects

PROJECT NO: 242G
START DATE: (m/yr): 05/86
RES. PRIORITY:

SHORT TITLE: Pentachlorophenol

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. N.K. Kaushik, Department of Environmental Biology
and Affiliation: University of Guelph

LIAISON OFFICER: Mr. Luek Wong, Water Resources Branch
(name, location, phone no.) 235-5813

INTERNAL PROJECTS

INTERNAL PROJECTS
Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): The current proposal will examine: (a) Bioconcentration and bioaccumulation of PCPs in Zooplankton using ^{14}C -labelled PCP; (b) Interaction of pH with PCP toxicity and bioavailability; (c) Effect of temperature on PCP toxicity (d) Toxicity tests then may be carried out under field conditions using limnocorals.

PROJECT DESCRIPTION: Factors affecting the toxicity of PCP such as the age and/or size of the test organisms, pH, temperature, hardness, and exposure duration on the acute and chronic toxicity of both formulations of PCP to the two species of daphnids will be investigated.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	5.6			5.6
	Salaries :	9.5			9.5
Budget	Total :	15.1			15.1
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf.. 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract X Solicited Date : May 22, 1987
INTERNAL Grant Unsolicited X Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Demonstration of the Phoredox Process PROJECT NO: 243G
at Lakeview WPCP START DATE: (m/yr): 05/86
RES. PRIORITY:

SHORT TITLE: Phoredox Process MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator George G. Powell, P. Eng.
and Affiliation: Gore & Storrie Limited

LIAISON OFFICER: Mr. K. Brown - South Peel Water Supply System
(name, location, phone no.) 274-6710

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To evaluate the effect of the introduction of the Phoredox process on overall plant performance.

PROJECT DESCRIPTION: The anaerobic zone in the Phoredox process has the potential to reduce aeration requirements, improve BOD removal, solids settling and sludge handling. Biological removal of phosphorus is also possible. One unit of the Lakeview WPCP will be converted to operate in this mode.

ANTICIPATED RESULTS: 1. Substitution of mixing for aeration results in less power usage.
2. Removal of chemical for phosphorus removal results in reduced operational costs.
3. Improved BOD removal results in potential for retrofitting for fine bubble aeration. This should also reduce operation costs.
4. Improved and lesser solids handling should be experienced.
5. Improved settling results in a better effluent quality.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	5.0			5.0
	Salaries :	20.0			20.0
Budget	Total :	25.0			25.0
Source: RAC	Man Years :	0.2			0.2

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 29, 1987
Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Treatment of Landfill Leachate
by Spray Irrigation

PROJECT NO: 244G
START DATE: (m/yr): 05/86
RES. PRIORITY:

SHORT TITLE: Spray Irrigation

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. R.A. McBride, Land Resource Science
and Affiliation: University of Guelph

LIAISON OFFICER: A. Oda - Waste Management Branch
(name, location, phone no.) 323-5129

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To evaluate leachate spray irrigation as an economic, environmentally-sound, and long-term solution to one particular sanitary landfill seepage problem (Muskoka Lakes) with a view to providing in the long-term recommendations and implementation procedures for this type of waste-disposal across the province.

PROJECT DESCRIPTION: This is a multi-disciplinary study with several research thrusts. The project encompasses a literature review on sanitary leachate disposal phenomena, and individual studies on forest hydrology/sub-hydrology, spray-area soil-vegetation relationships, phytotoxicity, forest evapotranspiration and leachate pretreatment.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	41.0			41.0
	Salaries :	41.5			41.5
Budget	Total :	82.5			82.5
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports): Report: "Treatment of Landfill Leachate by Spray Irrigation"; Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: Project is now completed except for the final report.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited X
INTERNAL Grant X Unsolicited X

Date : May 22, 1987
Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Reproductive Outcomes
in Southwestern Ontario

PROJECT NO: 245G
START DATE: (m/yr): 07/86
RES. PRIORITY:

SHORT TITLE: Reproductive outcomes

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. J. Robertson, Dept. of Epidemiology and Biostatistics
and Affiliation: University of Western Ontario

LIAISON OFFICER: L.F. Smith - Ministry of Health 963-2238
(name, location, phone no.) A. Vajdic - Water Resources Branch 323-4873

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To carry out an epidemiological study of potential health effects caused by chemical spills and potential contamination of drinking water in the Lambton and Kent counties.

PROJECT DESCRIPTION: The level of effects on reproductive outcomes and risk caused by the threat posed by the St. Clair River chemical contamination will be documented retrospectively.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	65.0			65.0
	Salaries :				
Budget	Total :	65.0			65.0
Source: RAC	Man Years :	6.3			6.3

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):
Funded jointly with the Ministry of Health (\$65,000).

COMMENTS: Completion date is now January 1988.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.)

EXTERNAL X	Contract	Solicited	Date : May 27, 1987
INTERNAL	Grant X	Unsolicited X	Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Study of the Thermal Reactions of Polychlorinated Dibenzo-p-Dioxins on Flyash Particles under Incinerator Conditions	PROJECT NO: 246G
	START DATE: (m/yr): 04/86
	RES. PRIORITY:

SHORT TITLE: Dioxins/Flyash	MBR PROJECT CATEGORY:
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EXTERNAL PROJECTS

Principal Investigator Dr. F.W. Karasek, Professor of Chemistry
and Affiliation: University of Waterloo

LIAISON OFFICER: Dr. R. Clement - Laboratory Service Branch
(name, location, phone no.) 235-5890

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): Incinerator flyash will be placed in a heated flowtube. Nitrogen will be passed through the flyash to an impinger/florisil combination which will absorb any organic compounds volatilized from the flyash. Some suspected precursors of chlorinated dioxins and dibenzofurans will be introduced into the gas stream above the flyash. The flyash, flowtube, impinger and florisol will be analysed for dioxins and furans after each experiment. The temperature range of 100 C to 600 C will be investigated.

PROJECT DESCRIPTION: 1. Establish the thermal behaviour of chlorinated dioxins and dibenzofurans on flyash particles under incinerator conditions.
2. Identify precursors and establish mechanisms of dioxin formation on flyash particles.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	24.0			24.0
	Salaries :	6.0			6.0
Budget	Total :	30.0			30.0
Source: RAC	Man Years :	0.5			0.5

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf., 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 22, 1986
Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Metal Uptake by
Cladophora Glomerata in Niagara River

PROJECT NO: 248G
START DATE: (m/yr): 04/86
RES. PRIORITY:

SHORT TITLE: Metal Uptake/Cladophora

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. Pamela Stokes, Institute for Environmental Studies
and Affiliation: University of Toronto

LIAISON OFFICER: M. Jackson - Water Resources Branch
(name, location, phone no.) 235-5812

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): 1. To determine the rate of uptake and loss of selected heavy metals in Cladophora Glomerata in the Niagara River.
2. To determine the seasonal variation in selected heavy metals in Cladophora Glomerata in the Niagara River.

PROJECT DESCRIPTION: Rates of uptake and loss of heavy metals in Cladophora will be determined by transfer experiments among sites along the river. Water and algal samples will be taken on a weekly basis throughout the summer; in order to determine seasonal variation in metal levels.

The rate of uptake will be rapid (hours) and the loss rate will be slow. This would lend support to the MOE programme for the use of Cladophora as a biomonitor.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	5.7			5.7
	Salaries :	1.3			1.3
Budget	Total :	7.0			7.0
Source: RAC	Man Years :				

INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS:

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WBR, NER etc.)

EXTERNAL	X	Contract	Solicited
INTERNAL		Grant	X
			Unsolicited X

Date : May 22, 1987
Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Bioassessment of Contaminated Sediments

PROJECT NO: 249G
START DATE: (m/yr): 04/86
RES. PRIORITY:

SHORT TITLE: Sediments/Contaminants

MBB PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Drs. C. Nalewajko and C. Ewing, Life Sciences Division
and Affiliation: University of Toronto

LIAISON OFFICER: D. Persaud - Water Resources Branch
(name, location, phone no.) 323-4926

INTERNAL PROJECTS

INTERNAL PROJECTS
Principal Investigator:
(name location phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop simple, but sensitive bioassays for the assessment and prediction of the impact of sediment on open water primary contaminant producers and bacteria.

PROJECT DESCRIPTION: The bioassays will involve measurements of the effects of sediments on (a) phosphate availability to aquatic microorganisms; (b) growth rates as assessed by DNA synthesis; (c) algal growth rates as assessed by chlorophyll biosynthesis. Natural populations will be employed in (a); cultures in (b) and (c). Sediments of interest to MOE will be used for bioassays.

ANTICIPATED RESULTS: Aerobic sediments on disposal in open water can act as a phosphorus sink thereby decreasing phosphorus availability and primary production. Elevated concentrations of contaminants, including heavy metals, can depress primary producers directly, as well as indirectly by decreasing bacterial nutrient cycling.

BUDGET AND RESOURCES:	Year: (* current)	1 *	2	3	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	4.2			4.2
	Salaries :	6.8			6.8
Budget	Total :	11.0			11.0
Source:RAC	Man Years :	0.4			0.4
INTERNAL PROJECTS	Cost: (000's)				
	Operating:				
	Salaries :				
Budget	Total :				
Source:	Man Years :				

OUTPUT (papers, presentations, reports):
Paper presented at Tech. Trans. Conf. 1986

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRR, NRP etc.)

EXTERNAL X Contract Solicited
INTERNAL Grant X Unsolicited X

Date : May 25, 1987
Revision: October 6, 1987

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development of an Expert System
for Decision Making with Regard to Water Quality
in Ontario Rivers

PROJECT NO: 250G & 332G
START DATE: (m/yr): 05/86
RES. PRIORITY:

SHORT TITLE: Water Quality

MBR PROJECT CATEGORY:

EXTERNAL PROJECTS

Principal Investigator Dr. T.E. Unny, Department of Systems Design
and Affiliation: University of Waterloo

LIAISON OFFICER: Dr. L. Logan - Water Resources Branch
(name, location, phone no.) 323-4984

INTERNAL PROJECTS

Principal Investigator:
(name, location, phone no.)

SUPERVISOR:

OBJECTIVE(S): To develop an expert system for applications in decision making with regard to water quality in Ontario Rivers with the objective to;
1. provide a basis for the assessment of uncertainties in water quality parameters, and
2. to develop a procedure to determine the effect of random variations in these parameters in decision making.
3. to fill in the knowledge base of parameter specific toxicity. To test the prototype system and modify the program.

PROJECT DESCRIPTION: MOE manages Water Quality Monitoring at strategic locations in Ontario rivers with the objective to assess the effect on water quality, the impact of waste water discharges from municipal and industrial plants and of diffuse sources of wastes from agricultural and other land uses.

Readings on water quality are taken at frequent intervals (generally at the rate of one reading a month) on 65 tributaries. The readings include hydrological parameters (streamflow), physical parameters (temperature, turbidity, etc.) and nutrient parameters.

BUDGET AND RESOURCES:	Year: (* current)	1	2	3 *	TOTAL
EXTERNAL PROJECTS	Cost: (000's)				
	Operating:	7.5	7.5	7.5	22.5
	Salaries :	20.0	20.0	20.0	60.0
Budget	Total :	27.5	27.5	27.5	82.5
Source: RAC	Man Years :	1.0	1.0		2.0

INTERNAL PROJECTS	Cost: (000's)
	Operating:
	Salaries :
Budget	Total :
Source:	Man Years :

OUTPUT (papers, presentations, reports): Interim report, 1986; Paper presented at Tech. Trans. Conf., 1986; Paper presented at AGU conference, 1987

EXTERNAL PARTICIPATION (ministries, governments, agencies):

COMMENTS: Approved for third year extension to 250RR.

NOTE: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER etc.).

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The hydrological pathways of herbicide transport: field monitoring and comparison of application techniques and analysis of herbicide residues in soil, surface and subsurface waters.		PROJECT NO: OPAC 87-06 START DATE: (m/yr): 3/87 RES. PRIORITY:						
KEYWORDS: metolachlor, residues, field dissipation		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL <input type="checkbox"/> OR EXTERNAL <input checked="" type="checkbox"/>	Solicited <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/>	X Contract <input type="checkbox"/> Grant <input checked="" type="checkbox"/>					
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:		Dr. J. M. Buttle Geography Department Trent University Peterborough (705-748-1475)						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C. D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)		SUPERVISOR:						
OBJECTIVE(S): Examine total loading of metolachlor into receiving waters, comparing ppi treatment to pre-emerge treatment in corn at field site near Bailieboro; using improved field methodology quantify pathways of movement. Work to augment research conducted in 1986.								
PROJECT DESCRIPTION: A field site will be planted in corn and treated with 2.75 L/ha Dual (metolachlor) late May 1987. Soil samples will be taken at saturated footslope zone and upslope areas one hour and 1,2,3,4,6,8,10,12,16,24 and 52 weeks after application. Ground water flow, Hortonian overland flow and saturation overland flow measurements will be taken. Total herbicide and sediment losses will be calculated and compared for the two farming practices.								
BUDGET AND RESOURCES:	YEAR:	1 (85-29)	2	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	18.85 11.2 30.05* 1.2	15.0 14.0 29.000 1.1					33.85 25.2 59.05 2.3
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:	* 16.05 execution 14.0 analysis ** 15.000 execution 14.000 analysis						
OUTPUT (papers, presentations, reports): Presentation at annual OPAC symposium.								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Effect of flooding and crop rotation on pathogens in muck.		PROJECT NO: OPAC 87-08 START DATE: (m/yr): 3/87 RES. PRIORITY:						
KEYWORDS: flooding, crop rotation, white mold, nematodes, onion white rot		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____	OR EXTERNAL	<input checked="" type="checkbox"/> Solicited <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/> Contract <input type="checkbox"/> Grant					
EXTERNAL PROJECTS:		Dr. L. V. Edgington Department of Environmental Biology University of Guelph (519-824-4120)						
PRINCIPAL INVESTIGATOR AND AFFILIATION: LIAISON OFFICER: (name, location, tel.no.)		Dr. C. D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.) SUPERVISOR:								
OBJECTIVE(S): To test the effects of flooding on the control of fungal diseases on muck soil crops (onions white rot, white mold, nematodes).								
PROJECT DESCRIPTION: Previous research has shown control of onion white rot cannot be controlled by any one method. Research this summer is to determine the effect of flooding alone and in combination with crop rotation on three pathogens : onion white rot, sclerotinia white mold, and nematodes in plots at the Bradford Muck Research Station.								
BUDGET AND RESOURCES:	YEAR:	1 (84-24)	2 (85-02)	3 (86-26)	(4)	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	8.6	10.1	11.0	1.5 13.5 15.0 1.0			44.7
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports):								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Winter survival and economic thresholds for corn rootworms in field corn.		PROJECT NO: OPAC 87-09 START DATE: (m/yr): 3/87 RES. PRIORITY:						
KEYWORDS: economic threshold, corn rootworm, overwinter mortality		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____	OR	EXTERNAL Solicited _____ Unsolicited <input checked="" type="checkbox"/>					
			X Contract Grant <input checked="" type="checkbox"/>					
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:		Dr. C. R. Ellis Department of Environmental Biology University of Guelph. (519-824-4120)						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C. D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): To determine the over-winter survival of root worm eggs; to determine determine the relationship between late fall populations of beetles and damage to corn in the year following.								
PROJECT DESCRIPTION: Previous research has developed information on corn rootworm monitoring methods and economic thresholds. Current work is to extend the application of previous research to i) define maximum population that causes no damage the following year with greater confidence and ii) determine the significant factors causing winter mortality and the practicality of improving IPM in corn through predicting or monitoring winter mortality.								
BUDGET AND RESOURCES:	YEAR:	1 (84-04)	2 (85-03)	3 (86-04)	④	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	15.0	18.19	17.64	18.6			69.43
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC symposium.								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Field test of new corn rootworm pathogen		PROJECT NO: OPAC 87-10						
		START DATE: 3/87						
		RES. PRIORITY:						
KEYWORDS: biocontrol, corn rootworm		MBR PROJECT CATEGORY:						
RESEARCH INTERNAL _____ OR EXTERNAL <input checked="" type="checkbox"/>		Solicited <input type="checkbox"/> Contract <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/> Grant <input type="checkbox"/>						
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:		Dr. Philip Fitz-James Dept. of Microbiology and Biochemistry University of Western Ontario, London, Ontario						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C.D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): To determine minimal concentration of cultures of <u>Bacillus laterosporus</u> to achieve rootworm control.								
PROJECT DESCRIPTION: A subspecies of <u>B. laterosporus</u> has been subject to greenhouse tests against western corn rootworm <u>Diabrotica vergifera</u> : these tests indicate a marked protective action of the culture against 1st instar larvae of <u>Diabrotica</u> at a level of about 10^9 spores per metre of row or 10^7 spores per cubic cm of soil. Current research proposes to conduct field tests in sweet corn and OH10 43 feed corn with different concentrations and components of the culture.								
BUDGET AND RESOURCES:	YEAR:	1	2	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	1.1						1.1 4.9 6.0 .36
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports):								
EXTERNAL PARTICIPATION (other ministries, agencies): Presentation at annual OPAC Symposium.								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Effects of post spray weather on the foliage life of <u>B.t.</u>		PROJECT NO: OPAC 87-11 START DATE: 3/87 RES. PRIORITY:						
KEYWORDS: <u>Bacillus thuringiensis</u> , weathering influences, residual toxicity, spruce budworm		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____	OR	EXTERNAL <input checked="" type="checkbox"/> Solicited _____ Unsolicited <input checked="" type="checkbox"/>					
		Contract _____ Grant <input checked="" type="checkbox"/>						
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:		Dr. Kees van Frankenhuyzen Sault College of Applied Arts and Technology Sault Ste. Marie (705-949-9461)						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C.D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)		SUPERVISOR:						
OBJECTIVE(S): To assess the post spray life of B.t. in relation to weather and to test the effectiveness of protective adjuvants.								
PROJECT DESCRIPTION: Balsam fir seedlings with freshly flushed buds will be sprayed in a spray chamber, mimicing aerial application. Seedlings will be placed outside and residual toxicity of B.t. will be monitored by frequent bioassay. Comparison will be made on effects of full sun and rain, shade and rain, shade and no rain. Formulation of oil base and water base will be tested with and without sticker adjuvants.								
BUDGET AND RESOURCES:	YEAR:	1 (86-05)	2 <input checked="" type="circle"/> 3 4 5 6 TOTAL					
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	5.508 6.75 2.258 0.5	1.3 10.6 11.9 0.5					6.808 17.35 14.158 1.0
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

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Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Improved efficacy of chemical control of white mold in snap bean.		PROJECT NO: OPAC 87-13 START DATE: 3/87 RES. PRIORITY:						
KEYWORDS: snapbeans, <u>Sclerotinia sclerotiorum</u> , predictive model.		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____	OR	EXTERNAL <input checked="" type="checkbox"/> Solicited _____ Unsolicited <input checked="" type="checkbox"/>					
		Contract _____ Grant <input checked="" type="checkbox"/>						
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:		Dr. Robert Hall Dept. of Environmental Biology University of Guelph, Guelph, Ontario (519-824-4120)						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C.D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): To test the utility of a predictive model for fungal infection in snap beans and to test the efficacy of spray applications as recommended by the model.								
PROJECT DESCRIPTION: A predictive model currently exists to predict severe white mold infections in white beans. Current research is to adapt this model to snap beans to being sufficiently sensitive to predict yield limiting levels of the disease (< 2% pods infected) in snap beans. Pathogen, crop and environmental factors will be monitored in relation to the development of white mold in snap beans and the effectiveness of fungicide sprays applied according to the model will be tested.								
BUDGET AND RESOURCES:	YEAR:	1	2	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	3.0						3.0 7.0 10.0 .5
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The development of an IPM module for the control of phytophagous mites in apple orchards.		PROJECT NO: OPAC 87-14 START DATE: 3/87 RES. PRIORITY:	
KEYWORDS: phytophagous mites, apples, predictive model MBR PROJECT CATEGORY:			
RESEARCH CATEGORY:	INTERNAL <input type="checkbox"/>	OR EXTERNAL <input checked="" type="checkbox"/>	Solicited <input type="checkbox"/> Contract <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/> Grant <input checked="" type="checkbox"/>
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:	Dr. Rudolf Harmsen Biology Department Queen's University, Kingston, Ontario (613-547-3072)		
LIAISON OFFICER: (name, location, tel.no.)	Dr. C.D. Fowle, OPAC		
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)			
SUPERVISOR:			
OBJECTIVE(S): To test the reliability of the model in the presence of insecticides			
PROJECT DESCRIPTION: Previous research has resulted in a TPTP model for 2 taxa: spider mites (<u>P. ulmi</u> ; <u>T. urticae</u>) and rust mites (<u>A. schlechtendali</u>) and two predatory taxa: the stigmaeids and the phytoseiids. The model appears capable of predicting the likelihood of pestiferous mite populations exceeding economic thresholds. Field trial at Smithfield in 1986 failed to accurately predict mite populations as the model could not take into account effects of pesticide application on mites. Current field research will lead to modification of the model. Work to continue in 1988.			
BUDGET AND RESOURCES:	YEAR:	(1) 2 3 4 5 6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	1.5 3.5 5.0 Other funds (\$10,000) from Queen's and Ag. Canada support this project.	1.5 3.5 5.0
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:		
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium			
EXTERNAL PARTICIPATION (other ministries, agencies):			
COMMENTS			

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Effects of microencapsulated and EC permethrin and a new generation synthetic pyrethroid SAN 811-I on stream invertebrates		PROJECT NO: OPAC 87-15 START DATE: 3/87 RES. PRIORITY:						
KEYWORDS: permethrin, aquatic invertebrates, constant flow field bioassay.		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____	OR	EXTERNAL _____ Solicited _____ Unsolicited <input checked="" type="checkbox"/>					
		Contract _____ Grant <input checked="" type="checkbox"/>						
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:		Dr. N.K. Kaushik Dept. of Environmental Biology University of Guelph, Guelph, Ontario						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C.D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): To assess the effect of micro-encapsulation on the toxicity of permethrin to aquatic invertebrates; and to determine EC ₅₀ and EC ₉₀ for new synthetic pyrethroid SAN 811-I.								
PROJECT DESCRIPTION: Field bioassays will be carried out at a suitable stream near Guelph. Selected invertebrates (Plecoptera, Ephemeroptera, Trichoptera, Diptera and and Amphipoda) and black fly larvae will be exposed to a stream containing toxicant in vinyl eavestrough; values for EC ₅₀ and EC ₉₀ will be determined by probit analysis. Capsules will be partitioned by size prior to bioassay to help determine capsule size/toxicity relationships.								
BUDGET AND RESOURCES:	YEAR:	1	2	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	4.5						4.5 9.0 13.5 1.0
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual Symposium								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Microbiol biocontrol for suppressing milkweed feed production, using yeasts to curtail fertilization		PROJECT NO: OPAC 87-16 START DATE: 3/87 RES. PRIORITY:		
KEYWORDS: biocontrol, milkweed, fertility, reduction by yeasts		MBR PROJECT CATEGORY:		
RESEARCH CATEGORY:	INTERNAL <input type="checkbox"/>	OR EXTERNAL <input checked="" type="checkbox"/>	Solicited <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/> Contract <input type="checkbox"/> Grant <input checked="" type="checkbox"/>	
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:	Dr. G. Kevan Dept. of Environmental Biology University of Guelph (519-824-4120)			
LIAISON OFFICER: (name, location, tel.no.)	Dr. C.D. Fowle, OPAC			
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)				
SUPERVISOR:				
OBJECTIVE(S): To follow up on previous research to test the efficacy of yeasts in preventing fertilization.				
<p>PROJECT DESCRIPTION: The yeast, <u>Metschnikowia reukauffii</u>'s presence in the nectar of common milkweed (<u>Asclepias syriaca</u>) highly correlates with failure of pollen germination. Current research proposes to gear up for rigorous experimentation on known biotypes of yeasts and milkweed in 1988: establish known biotypes of yeast and milkweed in the greenhouse and field; test known yeast cultures under highly controlled conditions of pollination; bioassay for virulent strains of <u>M. reukaufic</u>; propagate milkweed clones.</p>				
BUDGET AND RESOURCES:	YEAR: (86-08)	1 <input checked="" type="checkbox"/>	2 <input type="checkbox"/>	
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	7.45 7.6 15.05 1.45	5.0 2.6 7.6 0.4	12.45 10.2 15.65 1.85
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:			
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium				
EXTERNAL PARTICIPATION (other ministries, agencies):				
COMMENTS				

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Developing an implementation protocol for fruit-set and seed-set of the forest wildflower <u>Polygonatum pubescens</u> in an insect monitoring system.		PROJECT NO: OPAC 87-17						
KEYWORDS: biological indicator, hairy Solomon's Seal, forest wild flower.		START DATE: 3/87						
RESEARCH CATEGORY: INTERNAL _____ OR EXTERNAL _____ Solicited _____ Unsolicited <input checked="" type="checkbox"/>		RES. PRIORITY: Contract _____ Grant <input checked="" type="checkbox"/>						
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION: LIAISON OFFICER: (name, location, tel.no.)		Dr. P.D. Kingsbury Sault College of Applied Arts and Technology Sault Ste. Marie (705-949-9461) Dr. C.D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.) SUPERVISOR:								
OBJECTIVE(S): <u>P. pubescens</u> (hairy Solomon's Seal) has been identified as a suitable species for assessing impact of spraying on pollination and fruit-set. Its value as a monitor will be further tested.								
PROJECT DESCRIPTION: <u>P. pubescens</u> on dependence "pollinators and relative self-incompatibility will be verified; investigation will be made of the relative role of presumed pollinators in the pollination of <u>P. pubescens</u> and observations made in field on the relative contribution of each pollinator to supplement previous research.								
BUDGET AND RESOURCES:	YEAR:	1 (86-09)	2	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	1.0 9.6 10.6 0.6	1.0 11.5 12.5 0.6					2.0 21.1 23.1 1.2
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Introduction of <u>Holcothorax testaceipes</u> (Hymenoptera: Encyrtidae) for the biological control of spotted tentiform leafminer, <u>Phyllonorycter blancardella</u> (Lepidoptera: Gracillariidae)		PROJECT NO: OPAC 87-18 START DATE: 3/87 RES. PRIORITY:						
KEYWORDS: Biocontrol, tentiform leafminer		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL <input type="checkbox"/>	OR EXTERNAL <input checked="" type="checkbox"/>	Solicited <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/> Contract <input type="checkbox"/> Grant <input checked="" type="checkbox"/>					
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION: (name, location, tel.no.)		Dr. J.E. Laing Dept. of Environmental Biology University of Guelph, Guelph, Ontario (519-824-4120)						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C.D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): To continue experimental releases of the parasite and evaluate its effectiveness and tolerance to pesticides.								
PROJECT DESCRIPTION: The spotted tentiform leafminer (<u>P. blancardella</u>) is one of the most serious pests of apples in Eastern North America. The object of current research is to establish <u>H. testaceipes</u> (imported from Japan) in apple orchards in Ontario, determine if this parasite is tolerant to synthetic pyrethroids, evaluate the effectiveness of this parasite controlling the leaf miner.								
BUDGET AND RESOURCES:	YEAR:	1 (85-08)	2 (86-10)	(3)	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	1.047 4.0 5.047 .8	1.68 13.16 14.84 .8	1.1 6.75 7.85 .75				3.827 23.91 27.737 2.35
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Assessment of pre-emergence herbicides for weed control in onions.		PROJECT NO: OPAC 87-19 START DATE: 9m/yr): 3/87 RES. PRIORITY:						
KEYWORDS: onions, herbicides, metolachlor, oxydiazon, oxfluorfen, chlorpropham		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____	OR	EXTERNAL _____ <input checked="" type="checkbox"/> Solicited <input checked="" type="checkbox"/> Unsolicited					
			<input checked="" type="checkbox"/> Contract <input checked="" type="checkbox"/> Grant					
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION: (name, location, tel.no.)		Dr. V. Souza Machado Department of Horticultural Science University of Guelph (519-824-4120)						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C. D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): To continue evaluation of herbicides for onions.								
PROJECT DESCRIPTION: Five years research was devoted to examining alternatives to allidochlor in onions. This current year (final) is to continue examining pre-emergence herbicides for weed control in onions; the crop is so sensitive that it has been difficult to find an effective one. Products under examination are metolachlor (Dual) oxydiazon (Ronstar), oxyfluorfen (Goal) and chlorpropham (CIPC).								
BUDGET AND RESOURCES:	YEAR:	1 (82-25)	2 (83-10)	3 (84-18)	4 (85-16)	5 (86-11)	(6)	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	- 6.0 6.0 0.5	- 7.0 7.0 0.6	- 8.0 8.0 0.6	- 10.0 10.0 0.6	- 8.0 8.0 0.6	.5 7.5 8.0 0.6	0.5 46.5 47.0 3.5
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC symposium.								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Weather timed fungicide on tomatoes for improved disease control.		PROJECT NO: OPAC 87-20 START DATE: (m/yr): 3/87 RES. PRIORITY:						
KEYWORDS: tomatoes, weather-timed fungicide sprays MBR PROJECT CATEGORY:								
RESEARCH CATEGORY:	INTERNAL <input type="checkbox"/> OR EXTERNAL <input checked="" type="checkbox"/>	Solicited <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/>	Contract <input type="checkbox"/> Grant <input checked="" type="checkbox"/>					
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:		Mr. S. R. Mackey, et al Agriculture Research Department H. J. Heinz Company of Canada Leamington, Ontario (519-326-5701)						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C. D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): To develop cost-efficient spray program for the control of tomato diseases.								
PROJECT DESCRIPTION: This year's objective is to develop a least-cost commercial spray program for control of tomato fungal diseases : at 12 commercial farms within 3 general areas - Harrow West, Harrow East and Leamington North, half the plots (2-4 hectares each) will be sprayed according to Pub. 363 and half sprayed according to disease severity values (DSV) with captan or chlorothalonil. DSV's are determined by leaf wetness and temperature readings.								
BUDGET AND RESOURCES:	YEAR:	1 (84-08)	2 (85-09)	3 (86-12)	4 <input type="circle"/>	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	3.03 4.97 8.0 0.63	2.6 5.4 8.0 .43	2.76 10.88 13.64 0.65	1.7 9.6 11.3 0.65			10.09 30.85 40.94 2.36
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC symposium.								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Assessment of the potential of <u>Aleochara bilineata</u> for the control of root maggots in the home garden.		PROJECT NO: OPAC 87-21	
		START DATE: 3/87	
		RES. PRIORITY:	
KEYWORDS: biocontrol, home garden, root maggots, <u>Aleochara bilineata</u>		MBR PROJECT CATEGORY:	
RESEARCH CATEGORY:	INTERNAL <input type="checkbox"/> OR EXTERNAL <input checked="" type="checkbox"/>	Solicited <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/> Contract <input type="checkbox"/> Grant <input checked="" type="checkbox"/>	
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:	Dr. D.G.R. McLeod c/o University of Western Ontario London, Ontario (519-679-4452)		
LIAISON OFFICER: (name, location, tel.no.)	C.D. Fowle, OPAC		
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)			
SUPERVISOR:			
OBJECTIVE(S): To assess the effectiveness of an insect predator for control of root maggot in home gardens; and estimate the relative abundance of parasites and predators in the home garden environment.			
PROJECT DESCRIPTION: Both the onion maggot and cabbage maggot may be controlled by <u>Aleochara bilineata</u> ; reliable rearing techniques are available for this parasitoid/predator. The London Horticultural Society has agreed to locate a number of home gardens for study. A. bilineata will be released in Group A gardens beginning April 28; Group B will be control; Group C will be monitored for parasites, predators and root maggots. A station will also be set up at Pack's Lane Field Station of the London Research Centre.			
BUDGET AND RESOURCES:	YEAR:	(1) 2 3 4 5 6 TOTAL	
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	1.7 13.0 14.7 0.75	1.7 13.0 14.7 .75
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:		
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium			
EXTERNAL PARTICIPATION (other ministries, agencies):			
COMMENTS			

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development of sex phermone traps for monitoring jackpine budworm		PROJECT NO: OPAC 87-22 START DATE: (m/yr): 3/87 RES. PRIORITY:						
KEYWORDS: jack pine, budworm, phermone traps		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____	OR	EXTERNAL <input checked="" type="checkbox"/> Solicited <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/> Contract <input type="checkbox"/> Grant <input checked="" type="checkbox"/>					
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:		Dr. C. J. Sanders Sault College of Applied Arts and Technology Sault Ste. Marie (705-949-9461)						
LIAISON OFFICER: (name, location, tel.no.)		Dr. C. D. Fowle, OPAC						
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.) SUPERVISOR:								
OBJECTIVE(S): To determine the optimum blend and concentration of phermone components determine the appropriate phermone dispenser, and determine suitable trap design and deployment of traps.								
PROJECT DESCRIPTION: Rearings will be completed and female insects will be sent for processing; work will continue with male moth bioassays to determine phermone components; plots will be established in areas with moderate to high density populations to set out traps with varying components and varying phermone dispensers.								
BUDGET AND RESOURCES:	YEAR:	1 (84-13)	2 (86-14)	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	0.6 3.2 3.8 0.23	2.379 3.9 6.279 0.3	0.1 4.0 4.1 0.4				3.0 11.1 14.179 0.93
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC symposium.								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Threshold for potato leafhoppers on potatoes in Ontario		PROJECT NO: OPAC 87-23						
		START DATE: 3/87						
		RES. PRIORITY:						
KEYWORDS: potato leafhoppers, economic threshold		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____ OR Solicited Unsolicited	EXTERNAL _____ Contract Grant <input checked="" type="checkbox"/>						
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION: LIAISON OFFICER: (name, location, tel.no.)	Dr. M.K. Sears Dept. of Environmental Biology University of Guelph, Guelph, Ontario (519-824-4120) Dr. C.D. Fowle, OPAC							
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.) SUPERVISOR:								
OBJECTIVE(S): A study of the relationship between leafhopper population and potato yield, leading to the determination of economic threshold for pesticide application.								
PROJECT DESCRIPTION: Small field plots of 'Superior' potatoes will be established in 4-5 locations. Leafhoppers would be applied and zero (control) and flour threshold densities (10, 25, 50 and 100 adults per 20 sweep sample). In a more intensive experiment treatments of insects will be made to plants at various stages of growth; conventional insecticides before and after will eliminate insects from other than the infestation period. Plants will be monitored for hopper burn, rate of photosynthesis, movement of photosynthates and yield.								
BUDGET AND RESOURCES:	YEAR:	1 (85-13)	2 (86-27)	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source: OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	1.902	0.95	4.0				6.852 33.5 40.352 3.22
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

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Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: A barrier trapping technique for control of <u>Glischrochilus quadrisignatus</u> and the assessment of the dispersal behaviour of the beetle between raspberry, corn and tomato fields		PROJECT NO: OPAC 87-24						
KEYWORDS: sap beetle, dispersal behaviour, picnic beetle		START DATE: 3/87						
		RES. PRIORITY:						
RESEARCH CATEGORY:	INTERNAL _____ OR EXTERNAL Solicited _____ Unsolicited <input checked="" type="checkbox"/>	X Contract Grant <input checked="" type="checkbox"/>						
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. S.M. Smith Biology Department University of Waterloo, Waterloo, Ontario (519-885-1211)								
LIAISON OFFICER: (name, location, tel.no.) Dr. C.D. Fowle, OPAC								
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): To test chemical attractants in barrier traps for control of sap beetle in raspberries and to asses dispersal among crops by mark capture.								
PROJECT DESCRIPTION: This beetle, a serious pest in tomatoes, raspberries and corn and vector of corn ear rot, responds to natural baits and chemical attractants suggesting mass trapping as a means of population suppression or crop protection. Traps will be set out in 6 raspberry fields to evaluate trapping effectiveness; 5 attractants will be tested as well during peak population times in July and August and differences in response noted; 12,000 beetles marked with fluorescent dyes will be released simultaneously in corn, raspberry and tomato fields and recapture throughout the season noted.								
BUDGET AND RESOURCES:	YEAR: EXTERNAL PROJECTS Budget Source OPAC	1 Cost: (\$000's) Operating: 1.4 Salaries : 13.6 Total : 15.0 Man years: 0.83	2	3	4	5	6	TOTAL 1.4 13.6 15.0 0.83
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

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 Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Fate of sulfonylurea herbicides in Ontario		PROJECT NO: OPAC 87-25
		START DATE: 3/87
		RES. PRIORITY:
KEYWORDS: Mobility, soil dissipation, herbicides, chlorsulfuron, metasulfuron methyl, sulfometuron methyl		MBR PROJECT CATEGORY:
RESEARCH CATEGORY:	INTERNAL _____ OR EXTERNAL _____ Solicited _____ Unsolicited <input checked="" type="checkbox"/>	Contract _____ Grant <input checked="" type="checkbox"/>
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:	Dr. G.R. Stephenson Dept. of Environmental Biology University of Guelph, Guelph, Ontario (519-824-4120)	
LIAISON OFFICER: (name, location, tel.no.)	Dr. C.D. Fowle, OPAC	
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)		
SUPERVISOR:		
OBJECTIVE(S): To compare activity and mobility of chlorsulfuron, metsulfuron methyl and sulfometuron methyl in typical Ontario soil (lab and growth room study); and examine persistence and leaching of chlorsulfuron (Glean) on rough turf at maximum rates for non-crop land weed control		
PROJECT DESCRIPTION: a) bioassay for activity using Guelph loam and plants seeds in styrofoam cups: soybeans, sunflower, alfalfa, lentils, tomatoes. b) use radio-labelled compounds in a soil column leaching study. c) apply 70 and 120 ai/ha chlorsulfuron to rough turf plot and sample 1 hour, 1, 3, 7, 14, 28, 56, 84, 112 and 300 days after treatment. Soil cores will be divided into 4 depths prior to analysis.		
BUDGET AND RESOURCES:	YEAR:	<input checked="" type="radio"/> 1 2 3 4 5 6 TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	2.0 29.0 31.0 1.2 Additional funds (\$58,000) are provided by DuPont.
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:	
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium		
EXTERNAL PARTICIPATION (other ministries, agencies):		
COMMENTS		

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Elimination of an insecticide resistant house fly population by sanitation and susceptible fly release		PROJECT NO: OPAC 87-26 START DATE: 3/87 RES. PRIORITY:						
KEYWORDS: Resistant house flies, sanitation control		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____	OR	EXTERNAL _____ Solicited <input checked="" type="checkbox"/> Contract _____ Unsolicited <input checked="" type="checkbox"/> Grant <input checked="" type="checkbox"/>					
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION: (name, location, tel.no.)		Dr. G.A. Surgeoner Dept. of Environmental Biology University of Guelph, Guelph, Ontario (519-824-4120)						
LIAISON OFFICER: (name, location, tel.no.) Dr. C.D. Fowle, OPAC								
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): To continue sanitation programs on a dairy farm and swine facility to show efficacy and economic return of sanitation for house fly control; release susceptible flies; monitor resistance to permethrin and dichlorvos in fly population in Davies' barn.								
PROJECT DESCRIPTION: Continue sanitation and fly release program in Davies' barn; examine effect of diets on fly production at swine facility. Determine LC ₅₀ values of permethrin and dichlorvos after susceptible flies mate with wild flies at Davies' barn; conduct bioassays at London facility to develop information on baseline resistance of resistant population, population (sanitation alone), population (sanitation plus fly release).								
BUDGET AND RESOURCES:	YEAR:	1 (85-18)	2 (86-19)	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	2.557 4.4 6.957 0.3	3.226 4.6 7.826 0.3	4.0 13.5 17.5 1.3				9.783 22.5 32.283 1.9
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation for annual OPAC symposium. Paper planned for J. Econ. Entomology and article for Milk Marketing Board's Newsletter								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Biological control of strawberry and raspberry diseases.		PROJECT NO: OPAC 87-27 START DATE: 3/87 RES. PRIORITY:
KEYWORDS: biocontrol, strawberries, raspberries, grey mold, brown rot		MBR PROJECT CATEGORY:
RESEARCH CATEGORY:	INTERNAL _____ OR Solicited Unsolicited	EXTERNAL X Contract Grant X
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION: LIAISON OFFICER: (name, location, tel.no.)	Dr. J.C. Sutton Dept. of Environmental Biology University of Guelph, Guelph, Ontario (519-824-4120) Dr. C.D. Fowle, OPAC	
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)		
SUPERVISOR:		
OBJECTIVE(S): To monitor populations of saprotrophic and weakly parasitic fungi and bacteria on strawberries and raspberries and determine temporal relationship with pathogens of <u>B. cinerea</u> and <u>Zythia</u> sp.; isolate same and assess impact of chlorothalonil and dodine on these antagonistic organisms.		
PROJECT DESCRIPTION: 1) Population on strawberry and raspberry leaves will be monitored at Arkell and Guelph. Microclimate variables will be monitored. 2) Various organisms from objective I will be isolated and maintained in culture. Those most promising will be tested in the field. 3) Field plots will be sprayed; populations of antagonists will be monitored in the plots from October to June.		
BUDGET AND RESOURCES:	YEAR:	1 2 3 4 5 6 TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	5.8 7.4 13.2 0.5 5.8 7.4 13.2 0.5
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:	
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium		
EXTERNAL PARTICIPATION (other ministries, agencies):		
COMMENTS		

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Effects of processing on permethrin residues on Ontario vegetables		PROJECT NO: OPAC 87-29 START DATE: 3/87 RES. PRIORITY:	
KEYWORDS: permethrin, food residues, cabbage green beans, processing effects		MBR PROJECT CATEGORY:	
RESEARCH CATEGORY:	INTERNAL _____	OR	EXTERNAL <input checked="" type="checkbox"/> Solicited <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/> Contract <input type="checkbox"/> Grant <input checked="" type="checkbox"/>
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:		Dr. A.B. Morrison Dept. of Food Service University of Guelph (519-824-4120)	
LIAISON OFFICER: (name, location, tel.no.)		Dr. C.D. Fowle, OPAC	
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)			
SUPERVISOR:			
OBJECTIVE(S): To determine the influence of processing on permethrin residues in green wax beans and cabbage.			
PROJECT DESCRIPTION: Cabbage will be harvested 3 days after the last application of permethrin and analysed washed and boiled, washed, boiled, fresh. Green beans will be harvested 3 days after the last application of permethrin and analysed fresh, blanched, washed, boiled, washed and boiled. Both crops will also be placed under simulated commercial processing and analysed for cis and trans permethrin using gas chromatography.			
BUDGET AND RESOURCES:	YEAR:	(1) 1 2 3 4 5 6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	8.2 - 8.2 0.2	8.2 - 8.2 0.2
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:		
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium			
EXTERNAL PARTICIPATION (other ministries, agencies):			
COMMENTS			

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Development of a monoclonal antibody probe for eggs and larvae of the parasite <u>Pholetesor ornigis</u>		PROJECT NO: OPAC 87-30						
		START DATE: 5/87						
		RES. PRIORITY:						
KEYWORDS: spotted tentiform leafminer, monoclonal antibody probe, <u>Pholetesor ornigis</u>		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL _____ OR EXTERNAL Solicited _____ Unsolicited <input checked="" type="checkbox"/>	X Contract Grant <input checked="" type="checkbox"/>						
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION: (name, location, tel.no.)	Dr. P. Faulkner Dept. of Microbiology and Immunology Queen's University, Kingston, Ontario (613-545-2450)							
LIAISON OFFICER: (name, location, tel.no.)	Dr. C.D. Fowle, OPAC							
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): Develop a monoclonal antibody probe to detect eggs and larvae parasite of spotted tentiform leafminer (<u>Phyllonorycter blancardella</u>). Once specific probes for this parasite are identified, they can be used to develop a kit for the field or laboratory detection of the parasite. Where the parasite is present, use of chemical sprays are not needed.								
PROJECT DESCRIPTION: Immunizing antigen will be acquired and prepared from eggs and larvae. Polyclonal antibodies and monoclonal antibodies will be produced in mice. The reliability of monoclonal antibodies for identifying parasitized early instar spotted tentiform leafminer larvae will be assessed. ELISA technique will be used.								
BUDGET AND RESOURCES:	YEAR:	1	2	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	3.5						3.5 5.0 8.5 0.2
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: The role of parasitoids in the collapse of jack pine budworm populations.		PROJECT NO: OPAC87-31 START DATE: 5/87 RES. PRIORITY:						
KEYWORDS: parasitoids, jack pine budworm		MBR PROJECT CATEGORY:						
RESEARCH CATEGORY:	INTERNAL <input type="checkbox"/>	OR	EXTERNAL <input checked="" type="checkbox"/> Solicited <input type="checkbox"/> Unsolicited <input checked="" type="checkbox"/> Contract <input type="checkbox"/> Grant <input checked="" type="checkbox"/>					
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:	Dr. V.G. Nealis Sault College of Applied Arts and Technology Sault Ste Marie, Ontario (705-949-9461)							
LIAISON OFFICER: (name, location, tel.no.)	Dr. C.D. Fowle, OPAC							
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): Carry out a detailed analysis of existing data to examine the relationship between parasitism and jack pine budworm cycles, leading to improvements in the ability to forecast expected defoliation from larval sampling.								
PROJECT DESCRIPTION: In 1985, a sampling technique was investigated to estimate the proportion of the jack pine budworm population that was parasitized and identify the proportion of dominant parasites: <u>Apanteles fumiferanae</u> and <u>Glypta fumiferanae</u> . In 1986, the effect of <u>B.t.</u> on these parasitoids was examined. This year data on density estimates will be combined with information derived from sampling and rearing or dissecting budworms collected from branch samples throughout the insect life cycle to provide a profile of natural mortality in outbreak populations and in those populations which are undergoing rapid decline.								
BUDGET AND RESOURCES:	YEAR:	1 (85-86)	2 (86-87)	3	4	5	6	TOTAL
EXTERNAL PROJECTS Budget Source OPAC	Cost: (\$000's) Operating: Salaries : Total : Man years:	3.42 4.0 7.42 1.0	0.9 5.5 6.4 0.33	0.5 9.5 10.0 0.51				4.82 19.00 23.82 1.84
INTERNAL PROJECTS Budget Source:	Cost (\$000's) DOE : Salaries : Total : Man years:							
OUTPUT (papers, presentations, reports):								
EXTERNAL PARTICIPATION (other ministries, agencies): Presentation at annual OPAC Symposium								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NBR, etc.)

DATE: June 8/87

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REVISION:

SCIENTIFIC RESEARCH AND DEVELOPMENT INVENTORY

PROJECT TITLE: Study of deposition of airborne contaminants in the Great Lakes Basin using lichens and mosses		PROJECT NO: OPAC 87-32						
		START DATE: 5/87						
		RES. PRIORITY:						
KEYWORDS: airborne contaminants, Great Lakes Basin; MBR PROJECT CATEGORY: lichens and mosses, bio-monitors								
RESEARCH CATEGORY:	INTERNAL _____ OR EXTERNAL _____ Solicited _____ Unsolicited <input checked="" type="checkbox"/>	Contract _____ Grant <input checked="" type="checkbox"/>						
EXTERNAL PROJECTS: PRINCIPAL INVESTIGATOR AND AFFILIATION:	Dr. P.M. Stokes and Dr. D.M. Whelpdale Institute of Environmental Studies University of Toronto, Toronto, Ontario							
LIAISON OFFICER: (name, location, tel.no.)	Dr. C.D. Fowle, OPAC							
INTERNAL PROJECTS PRINCIPAL INVESTIGATOR: (name, location, tel.no.)								
SUPERVISOR:								
OBJECTIVE(S): Complete analyses of organic and metal contaminants from samples collected late fall 1986 and continue sampling lichen <u>Cladina rangiferina</u> and <u>Sphagnum</u> moss at select sites around the Upper Great Lakes.								
PROJECT DESCRIPTION: On the basis of 1986 results, sample 10 sites in the fall and make collections of lichens and mosses in June, July, August, September and October at 3 sites (subset of the 10) to test for variability. Samples will be analysed for 5 PCB groups, 23 chlorinated hydrocarbon groups, 17 polycyclic aromatic hydrocarbon groups and 14 metals.								
BUDGET AND RESOURCES:	YEAR: Budget Source OPAC	1 (86-30) Cost: (\$000's) Operating: Salaries : Total : Man years:	2 13.5 1.5 15.0 0.3	3 11.5 3.5 15.0 0.5	4	5	6	TOTAL
EXTERNAL PROJECTS								25.0 5.0 30.0 0.8
Budget Source OPAC								
INTERNAL PROJECTS								
Budget Source:								
OUTPUT (papers, presentations, reports): Presentation at annual OPAC Symposium								
EXTERNAL PARTICIPATION (other ministries, agencies):								
COMMENTS								

Note: "External" refers to projects carried out by investigators outside the Ministry.
Please indicate budget source by organization (e.g. RAC, OPAC, WRB, NER, etc.)

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Environmental research
program, 1987-1988 :
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